Vol. 7, No. 9 SEPTEMBER, 1952

AGRICULTURAL CHEMICALS

In This Issue:

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AGRICULTURAL CHEMICALS

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VOL. 7 No. 9
SEPTEMBER 1952

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AGRICULTURAL CHEMICALS

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Editor

JOHN A. NICHOLSON
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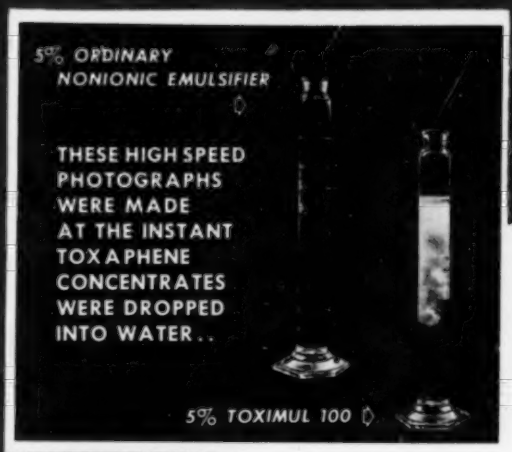

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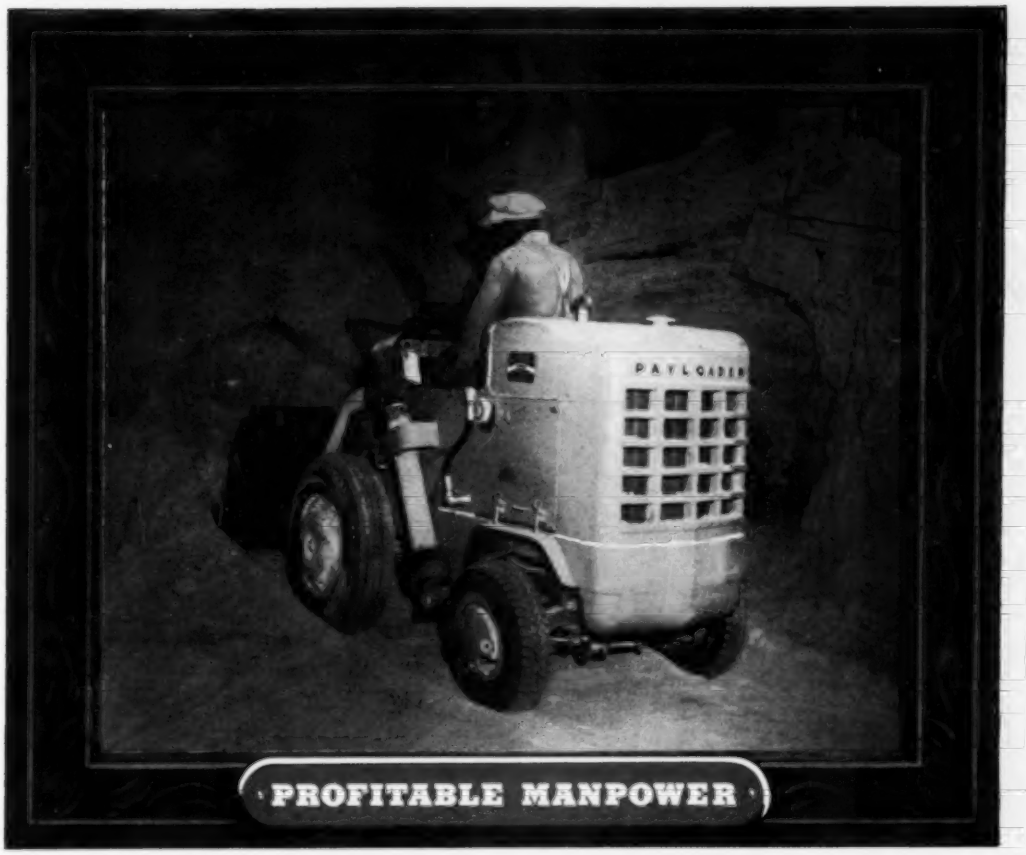

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THE EDITOR COMMENTS

A GOOD many reasons are being set forth as to the cause of the current situation in the insecticide trade. Why did the past season's business go sour? Was it widespread over-production? Was it the lack of insect infestations where heavy populations had been anticipated? Or is the industry somewhat at fault in failing to carry out an educational program on the use of insecticides as a *preventive* measure?

Probably all of these factors, and more, entered into the picture, but in the opinion of self-critical industry spokesmen, some manufacturers have not yet learned how to regulate their new potential for tremendous production. Output of most technical insecticidal chemicals has followed a straight uphill pattern for the past 3 or 4 years, with the exception of the ancestor of all the newer organics, DDT, which has experienced valleys and peaks during the past several seasons.

Looking back to the beginning of the 1951-52 season, inventories were regarded as being relatively low so far as manufacturers and distributors were concerned, although there appears to be no particular agreement about amounts on hand. But the reaction to this condition seemed to be unamimous . . . full production! As one industry observer described it, "The spigots were turned high, wide and handsome," with the results of "fantastic" production of material, with no apparent reason. Production of DDT is reported to have reached 130 million pounds per year, with BHC output even higher!

With this heavy production and no major insect infestation to consume great quantities of pesticides, it is easy to see how the industry could paint itself into a corner. We recall some talk in the March-April period that the rate of output was too high at that time . . . but still the production continued until just about all levels of the distribution setup were practically suffocating by August.

Yet, the element of chance is ever present. Suppose production were to be cut down and inventories allowed to be reduced, and then a widespread need for pesticides should arise suddenly! The industry must be prepared for such an eventuality, but at the same time should not over-produce! How to determine the happy medium between superabundance and too little is a mighty difficult problem in this business.

We can't presume to have a ready-made answer to this basic problem, but we do feel confident that this year's experience will act as a guide to scheduling production in future seasons.

WITH its announcement of a new Speakers' Bureau, the California Fertilizer Association has taken a step forward toward a good public relations program which should bear fruit in that area. Service and women's clubs, garden clubs and other local organizations have been invited to ask for speakers to address their meetings, and the CFA promises to have a qualified person available on short notice.

This step seems important to us mainly because it is in groups of this character that the "organiculturists" get in their best licks against the use of commercial fertilizer materials. One has only to talk five minutes to a club lady who has been subjected to anti-fertilizer propaganda, to see how deeply ingrained is their feeling. We are glad to see the CFA acting to offset this, and hope that its efforts will be successful.

THE way in which medical reports can be twisted out of their original context and meaning is illustrated once more in the case of a Hercules Powder Company report on toxaphene toxicity. Reporters, either not reading the medical report carefully, or else purposely exaggerating its sensational parts, came up with some rather frightening interpretations. The threat of such "scare" copy isn't over yet, although it has slowed down of late. Education of the user seems still to be the best defense against it.

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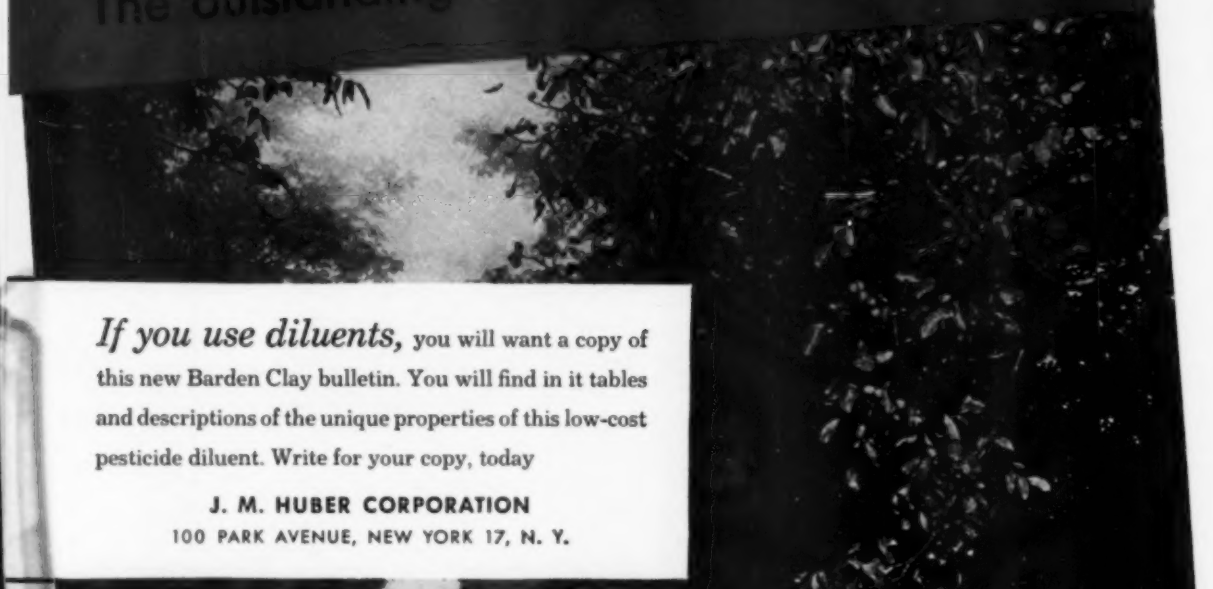

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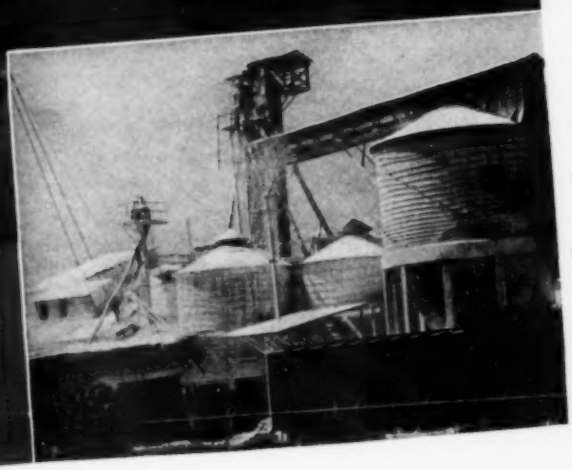


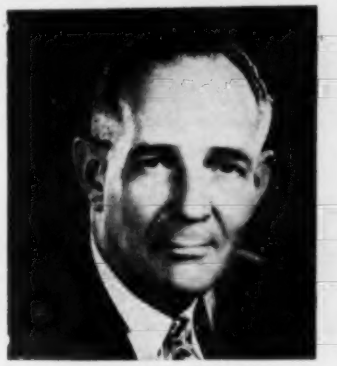
HUBER

It's time for Long-Range Planning

by

Arthur W. Mohr

President,
California Spray-Chemical Corp.
Richmond, California
President, National Agricultural Chemicals Assn.



ARTHUR W. MOHR
NACA President

AS we begin to close the tap on the distribution of agricultural chemicals during the 1952 season, we find the supply tank far from empty.

What happened this season in the manufacture, processing and distribution of pesticides illustrates the peculiarities of our industry — peculiarities that point up the necessity for planning that should extend, not from one season to the next, not for 2, 3, 5 or 10 years but from 15, 20 or 25 years and longer.

The 1952 season did not develop into a severe situation in regard to insect infestation. In the South, where the biggest chunk of our production is used for the protection of cotton, insect infestations did not materialize due to weather conditions adverse to their development. Other crop pests such as fruit insects and diseases, vegetable insects and diseases, weeds and other pests of field crops helped to drain off the huge and varied supply of pest control chemicals available.

In the main, and across the board, this was not a good year for the pesticides industry. It is true that some manufacturers and distributors, with a particular chemical in good demand for a unique pest, had a highly successful year; but this was far from the typical situation.

Producing at the rate of about 1¼ billion pounds of technical pesticidal chemicals annually, the industry was in full production prior to the beginning of the crop season. Distribution of the technical chemicals was carried out rapidly and formulators soon were stocked to capacity. To match the agricultural goals of the U. S. Department of Agriculture, the industry expanded plant facilities and built new plants to meet an expected demand for pesticides. In cooperation with the U. S. Department of Agriculture and Land Grant Colleges, the industry attempted to get dealers and growers to buy products early. But the early buying program broke down in the face of an adequate supply of pest control chemicals reported to be available for the current season. This season, it was possible for farmers to purchase enough pesticides to protect their crops without jeopardizing distribution facilities.

Due to the importance of agricultural chemicals in meeting the production goals of the Department of Agriculture, the pesticides industry was able to obtain sufficient raw materials

(Turn to *Page* 131)

Economics of Developing Agricultural Chemicals

IN the United States, highly organized industrial research laboratories, with their company's raw materials available, are a prolific source of new chemicals. Company biologists, accustomed to screening techniques, rapidly sort out those new chemicals which appear promising for agricultural uses. Then follows widespread field work, usually in experiment stations and the United States Department of Agriculture. It is the purpose of this paper to estimate the average cost involved in bringing to the market a new agricultural chemical through this sequence. The term "agricultural chemicals" is used here for convenience to refer to chemicals other than fertilizers which are used on the farm. Most of the emphasis will be placed on insecticides, fungicides and herbicides.

Four Testing Methods

THERE are at least four ways by which chemicals to be tested for agricultural uses may be selected:

1. All chemicals available to the company, or made from other research projects, may be screened as agricultural chemicals. A company's basic products or their intermediates in, for instance, synthetic fibers, might thus be tested.

2. Chemicals may be made specifically for use as agricultural chemicals based on accumulated knowledge of active chemical groupings. Thus it was logical that several companies investigated the entire series of the dithiocarbamates and their metallic salts once these compounds had been shown to be fungicidally active.

3. Compounds may be synthesized which are closely related to, or which duplicate naturally occurring materials. The synthesis of allethrin by the U.S.D.A. group was based on a knowledge of the chemistry of the naturally-occurring pyrethrin.

4. A study of physiology of the organism to be controlled may reveal that a given enzyme poison or antimetabolite may be indicated. For example, warfarin, the anti-vitamin K rodenticide, was selected on the basis that it was an effective anticoagulant which could be readily antidoted by Vitamin K if accidentally ingested by humans or domestic animals.

In general, the cost, per compound, is least where materials are already on the shelf, and most where a physiological and biochemical study must precede the synthesis of the desired compound. However, the percentage of effective compounds is likely to be least in those generally available, increase appreciably where they have been specifically designed for biological activity and be still higher where they are synthetic analogues of some naturally-occurring products. The method of physiologic study is fraught with uncertainties since the metabolic processes are so complex. Actually, the case of warfarin is the only one that comes to mind where this approach has worked, though only infrequent efforts have been made along this line.

Table I.
Cost of Various Fungicidal Screening Tests (after McCallan—1946)

Slide germination	$10
Greenhouse Early Blight	15
Greenhouse Late Blight	15
Phytotoxicity on tomatoes and beans	10
Pea Damping off	20
Mildew Resistance	10
Total	$80

Most companies supply their chemicals through one or the other, or more usually both, of the first two approaches mentioned. For the purpose of attempting to arrive at some figures of the cost of agricultural chemicals let us assume that the company is making specifically for agricultural purposes each compound that is to be screened. In any calculation it is only fair that each compound bear its share of all expenses pertinent to operating a chemical laboratory. On such a basis, each initial synthesis may cost as little as $25, if it is one of an homologous series of simple compounds. On the other hand, the cost may be as much as, or more than, $1,000 if it is a new composition of matter made by

by

Dr. R. H. Wellman

Carbide & Carbon Chemicals Co.
Division of
Union Carbide & Carbon Corp.
New York

a synthesis with which the chemist is unfamiliar. The average cost might be between $100 and $200 per compound.

Compounds thus made are then transmitted to the biologists for screening. Dr. S. E. A. McCallan at Boyce Thompson Insitute in 1946 for his own information made some estimates on the costs of laboratory screening work with fungicides exclusive of administrative or overhead costs. These estimates appear in Table I. and apply only where many compounds are regularly being tested.

IT would seem reasonable that costs have doubled since 1946, so that a similar screening program today would cost $160 per compound. In light of our own experience, these figures seem reasonable, though a group set-up for this purpose and operating continuously might be able to complete initial fungicide screening for $100 per compound. We believe the above tests are the minimum necessary to evaluate properly compounds as fungicides in screening tests and we subject all our compounds to about this number of tests before selections are made.

Insecticidal and herbicidal screening are equally complex and hence can be assumed to cost $100 each per compound; though if all three are run together, certain duplications can be avoided such as phytotoxicity tests so that a figure of $250 seems reasonable to screen a compound as an insecticide, fungicide and herbicide. It may seem unnecessary to screen materials that are specifically synthesized for biological activity for all three purposes.

Surely one should be able to tell in advance whether a compound is to be an herbicide, fungicide or insecticide. Maybe one should, but it is doubtful if any of those associated with such screening programs would rely on their judgment beyond being willing to assume that the next higher or lower member of a homologous series does not have to be tested if the parent compound was inactive. By using such an *a-priori* judgment screen, then the cost overall could come down to $200 because as much as 1/5 the time the compound would be presumed to be inactive and would not be tested (thus running through a series of homologues as fungicides they would not all have to be tested as insecticides).

Compounds that survive screening will go through further laboratory or greenhouse testing in order to compare them as precisely as possible with the standards available. Also their stability, compatabilities and formulations must be investigated. The cost of such further work will vary greatly depending on their end use but since the work now becomes quantitative and usually must be such that it is suitable for statistical evaluation, it is rare that this work will be less than three times as expensive as the total screening cost and it may be easily as much as *ten* times. An average might be five times or $1,000.

Chemicals that survive this further work are customarily passed on to the toxicologist for initial appraisal. His work at this stage might consist of acute oral toxicity, skin absorption, eye and skin irritation tests at a cost of approximately $400 per chemical, though if vapor hazards were involved, another $100 would have to be added for range finding tests on this phase of the hazards.

Field Tests Necessary

INITIAL field tests are now warranted. The fees charged by Dr. G. R. Townsend in Florida for initial field plot work are perhaps typical. He charges approximately $15 per plot. The chemical to be tested must be compared with probably two standard materials. In this stage, the chemical may be examined in three different formulations. At least three concentrations for each and the necessary standards; also four replications will be needed. The bill for the test as outlined would be about 900.

The initial field tests, when they look promising, are followed usually by patent applications, development of analytical techniques for residue analyses and further work on its toxicology. Then must follow large scale field tests in several different areas on all purposed applications over at least a two-year period. It will be necessary also to conduct two-year feeding tests on rats to gain knowledge of the chronic hazards from a toxicological standpoint, to

Table II.
Cost of Development of an Agricultural Chemical
(after Persing—1951)

	Range	
Attorney's Fees	$ 500 —	$ 5,000
Field Studies (all charges)	50,000 —	50,000
Toxicological Studies	20,000 —	30,000
Analytical Methods	10,000 —	10,000
Production Research and Pilot Plant Construction	75,000 —	250,000
Administration	10,000 —	10,000
Total	$165,500	$355,000

conduct tests for residue and also for presence of the compound within the edible portions of the crops treated.

During this time, the samples available have been turned out laboriously first in large scale laboratory work, later in a developmental unit and perhaps by now, in a pilot plan designed for this chemical. Engineering design of a full scale plant must be well along so that, coupled with a survey of the market, the economics of making and selling the compound can be evaluated thoroughly.

Dr. C. O. Persing, Stauffer Chemical Co., gave some figures in a recent talk before the Association of Economic Control Officials on cost of this phase of development.

These estimates seem entirely reasonable and could be averaged at about $250,000. As this stage develops, the experiment stations play an increasingly important part because of their unexcelled field testing facilities and because their obligation to serve their farmers makes it imperative that they find for the farmer the best solution of his problems. I believe industry and state and federal workers are to be congratulated on the wholeheartedness and effectiveness of this cooperative endeavor.

Agricultural Government workers will now want to test the new chemical on their own, fitting it into their own programs, using it in many different ways and for many different purposes. Such a program never ends but is usually particularly heavy during the five years after the compound reaches the stage described above. Of course during a major portion of this period the compound is being sold, at least in a developmental way, but the purpose of this paper is to attempt to assess the actual experimental costs which may be assessed to such a material. If the compound is at all generally promising it will be tested by at least thirty experiment stations. They will also be examining other materials.

Perhaps a typical case is one where a research worker and an assistant spend half-time investigating ten materials. Assessing against this work its fair share of experiment station costs, including the physical plant and administration, it is obvious that the cost per compound per year can scarcely be less than $1,000. This must be multiplied by thirty stations and five years to reach a cost of $150,000. The company's contribution to this work is, customarily, to supply the compound free and to have a man who serves the purpose of liason between the company and the experiment station worker. If each of the stations uses 10 lbs. of material per year, a total of 1,500 lbs. has been supplied. In these amounts, the chemical delivered to the station will cost the company between $2.00 and $20.00 a pound with $5.00 per pound being a possible average value for a total $7,500. The man's time, plus his expenses, may be assessed against two or more products. By reason solely of the relatively small number of compounds reaching this stage, it is unlikely that the average will be more than two compounds per man. Half a man's time and travel expense for five years might be $30,000.

In order to assess the cost per successful compound, it is necessary to estimate the number of failures and the stage at which failure is recognized. A few years ago there was a note in N. A. C. A. *News* that one company had screened 50,000 compounds as agricultural chemicals. In view of the number of companies interested, it seems entirely probable that at least 100,000 compounds had been screened by 1946. There has inevitably been a large amount of duplication but this has not affected the cost of the work done. A survey of the number of compounds selling in amounts more than 100,000 pounds a year which had been introduced in the last decade, found 35 such compounds. Perhaps a few were missed but if this experience is typical, it can be assumed that approximately 50 out of every 100,000 compounds examined, or one out of every 2000 compounds, may be expected to suc-

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Table III.

Costs Chargeable Against a Successful Agricultural Chemical

Synthesis	$ 150
Initial Screening	200
	350
1 in 30 succeed	x 30
	10,500
Further Laboratory & Greenhouse work	1,000
	11,500
1 in 10 succeed	x 10
	115,000
Initial Field Tests	900
1 in 3 succeed	x 3
	347,700
Company development cost	250,000
	597,700
1 in 2 succeed	x 2
	1,195,400
Company liason with Experiment Station cost	37,500
	1,232,900
Cost of State and Federal Work	150,000
Total research & development cost of successful chemical	$1,382,000

Properties and Effectiveness of

HEPTACHLOR

HEPTACHLOR is one of a series of synthetic chlorinated hydrocarbons developed by the Velsicol Corporation to meet the ever-expanding need for materials to control agricultural pests. Early test results indicated the promise and value of this compound for the control of a wide variety of insect pests.

Following its initial screening evaluation, heptachlor was supplied to research workers in the United States Department of Agriculture Experiment Stations, University and State Experiment Stations and other field and research laboratories. These programs progressed concurrently, duing which time Velsicol's heptachlor formulations were tested and proven under actual field and commercial conditions.

From the results obtained, these formulations were found particularly effective in the control of several of the insect pests destructive to cotton. In addition to the insecticidal efficiency of heptachlor, tests made on cotton seed oil and cotton seed meal, taken from heptachlor-treated plots, showed no evidence of translocation.

Based upon this extensive and thorough testing program, the Velsicol product was recommended and given label approval for use in the control of several of the cotton insect pests.

Description and Properties

HEPTACHLOR is the common name which has been assigned to the compound 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4, 7-methanoindene.

In the pure form, heptachlor is a white crystalline substance with a melting point of 95°-96° C. The total chlorine content of pure heptachlor is 66.5%.

Technical heptachlor is the term designated for the product as commericially produced. It consists of 67% heptachlor and 33% related compounds. This composition provides a convenient basis for the purpose of calculating formulations. To formulate on the basis of weight of actual heptachlor, it is only necessary to use one and one-half pounds of technical heptachlor for each pound of actual heptachlor required in the formulation.

Compatibility

FROM laboratory and field test results, heptachlor has been found compatible with most of the following commonly used insecticides and fungicides:

DDT
Chlordane
Dusting sulfur
Benzene hexachloride
Toxaphene
Dinitro compounds
Dithocarbamates
Quinones
Bordeaux Mixture

Types of Formulations

HEPTACHLOR can be applied in many formulations and has been used in both large and small scale tests as dusts containing from

TABLE 1

Typical Properties of Technical Heptachlor

Physical Properties	
Form @ Room Temperature	Soft, waxy solid
Melting Point Range	115°-165° F. (46.1°-73.9° C.)
Density @ 90° C.	1.57-1.59
Rate of change of Density with Temperature	(0.002/degrees C. in the Range of 40°-95°C.)
Viscosity @ 90° C.	50-75 Centistokes
Rate of change of Viscosity with Temperature	(2 centistokes/degree C. in the range of 40°-60° C.)
Color	Light Tan
Specific Heat	0.3 cal. per degree C.
Vapor Pressure	0.0003 mm @ 25° C.
Solubility	
Xylene	40% by weight
Methylated Naphthalenes	40% by weight
Water	Insoluble

1 to 10%, as a 25% wettable powder as base oil solutions containing up to 10 percent and as emulsifiable concentrates containing 2 pounds of heptachlor per gallon, 2 pounds of heptachlor plus 2 pounds of DDT per gallon and 1 pound of heptachlor plus 2 pounds of DDT per gallon. The recommended formulations for cotton insect control are:

1. **Heptachlor 2-1/2% Dust.**
2. **Heptachlor 2-1/2% — DDT 5% Dust.**
3. **Heptachlor 2-1/2% — DDT 5% Sulfur 40% Dust.**
4. **Heptachlor Emulsifiable Concentrate containing 2 lbs. of actual heptachlor per gallon.**
5. **Heptachlor Emulsifiable Concentrate containing 1 lb. heptachlor and 2 lbs. DDT per gallon.**

Insecticidal Uses

CONTROLLING insects as both a contact and stomach insecticide, heptachlor affects both sucking and chewing insects. It acts as a stomach poison when used as a foliage treatment for leaf eating insects, such as grasshoppers, alfalfa weevils, and crickets. As a contact insecticide, it is effective against a large number of

Pests Controlled by Heptachlor and Suggested Concentrations

Insect Pest	*Scientific Name*	*Dosages Required for Control*
Agromoyzid leaf miner	Agromyza sp.	½—1 lb. actual heptachlor per acre showed promise in control.
Alfalfa snout beetle		5 lbs. actual per acre showed only .43% plant injury in 2 weeks.
Alfalfa Weevil	Hypera postica (Gyll.)	2—½ to 4 oz. actual per acre has given control. It may be applied as an oil or water type spray.
Ambrosia Beetle	Scolytus sp.	A 5% oil solution applied to logs stacked at the mill or in forest gave good control of the ambrosia beetle.
Ant	Formicidae	Add 2-3 teaspoonsful of 25% wettable powder to 1 quart of water and pour in entrance to nest. Also 1 tablespoonful of 2-½% dust may be applied at the nest entrance.
Argentine Ant	Iridomyrmex humilis Mayr.	8 lbs. of 25% wettable powder in 100 gallons of water has given good control when applied to the trunks or litter under trees. The emulsifiable concentrate gave 6 months residual protection while wettable powder gave 4 months.
Black Vine Weevil	Brachyrhinus sp.	Soil applications of 5 to 10 lbs. per acre have given control. Also 40 to 50 lbs. of 2-½% dust applied to alfalfa per acre gave control of adults.
Blow Fly	Calliphora sp.	.4 to .5 lb. per acre gave control.
Boll Weevil	Anthonomus grandis Boheman	Apply 5 to 8 lbs. of 2-½% dust or .15 lb. heptachlor as a spray when cotton is small. When full grown, apply ¼ lb. of actual heptachlor per acre.
Cabbage Maggot	Hylemyia brassicae (Bouche)	2-½% dust applied to roots and stems before planting gave control. Also plants dipped in a water containing 1 lb. in 50 gallons of water gave control.
		1 lb. actual per 50 gallons of water may be poured along the row at planting time. 4-6 lbs. actual per acre may be applied to the soil and worked in top few inches.
Carpet Beetle	Attagenus sp.	Dilutions of 1 to 1000 have given control as well as giving good residual protection.
Chinch Bug	Blissus leucopterus (Say)	½—1 lb. actual heptachlor per acre has given control.
Clover Root Borer	Hylastinus obscurus (Marsham)	1-½ to 1-¾ lb. actual heptachlor per acre will give very effective control.
Corn Borer (European)	Pyrausta nubilalis (Hubner)	2-3 lbs. of 25% wettable powder per 100 gallons of water has given promising control results.
Corn Earworm	Heliothis obsoleta (Fab.)	0.5 to 0.75% heptachlor in white mineral oil has given good results. 2 or 3 applications at the time the silks appear may be necessary.
Corn Rootworm	Diabrotica sp.	½ to 3 lbs. per acre will give control depending upon type of application, type of soil, and crop protected.
Cotton Thrip	Thrips sp.	Apply .08 lb. per acre as a spray or 5 to 8 lbs. of 2-½% dust per acre when cotton is small. As the cotton becomes larger, increase the amount of the material used per application.
Cowpea Curculio	Chalcodermus aeneus Boheman	20-35 lbs. of 2-½% dust per acre will give control. 2 or 3 applications may be necessary.
Cricket	Gryllus sp.	4 oz. per acre has given good control where the crickets are attacking crops in the field.
Cucumber Beetle	Diabrotica sp.	20-30 lbs. of 2-½% dust has given control.
Cutworm	Noctuidas	1 lb. of actual heptachlor per acre.
European Chafer	Hoplia sp.	½ to 2 lbs. actual heptachlor per acre applied as a soil application.
Eye Gnat	Hippelates pusio (Loew)	2—2-½ lbs. actual heptachlor added to the top few inches of the soil.
Flea Beetle	Epitrix sp.	1-½ lbs. per acre as soil application shows promise in the control of flea beetle larvae.
Flea	Ctenocephalus sp.	Concentrations as low as .005% have given control.
Garden Webworm	Loxastege similalis	Apply 0.35 lb. heptachlor per acre. Either sprays or dusts may be used.

insects such as cotton flea hoppers, tarnished plant bugs and rapid plant bugs. Many insects are controlled by susceptibility to both modes of action.

During the past several seasons of testing, heptachlor gave effective control of most of the cotton insect pests and it was especially effective against the cotton boll weevil. Depending upon geographical location, and degree of infestation, 3 to 7 applications per season provide adequate protection to growing cotton. The high percentage of kill of boll weevil in the squares prevented a build-up in the population throughout the season.

Heptachlor has label registration for use in the control of several cotton insects. Insects included in the registration, and the amount of actual heptachlor which is recommended per acre are as follows: cotton boll weevil, cotton flea hopper, tarnished plant bug, and rapid plant bug, for all of which an application of from 0.17 lb. to 0.5 lb. actual heptachlor per acre is recommended; thrips, for which the recommendation is 0.08 lb. per acre;

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Grasshopper	Locustidae	2 to 4 oz. actual heptachlor per acre as a dust or spray. For bait, add 2½ oz. of heptachlor with 100 lbs. of bait and apply at the rate of 10 lbs. per acre.
Housefly	Musca domestica (Linne)	.05 to 0.1% concentrations are very effective in the control of houseflies. .036 lb. per acre gave 75% control of houseflies. 0.1% concentration gave complete control.
Human Lice	Pediculus sp.	
Japanese Beetle	Popillia Japonica (Newman)	1 to 5 lbs. of actual heptachlor per acre applied to the soil has given control. The dosage depends upon the type of soil.
Leaf Miner	Agromyzidae	3 to 5 lbs. of heptachlor per acre have given satisfactory control results.
Lygus Bug	Lygus sp.	½ lb. heptachlor in 30 gallons of water per acre gave good control of lygus bugs in alfalfa.
Mormon Cricket	Anabrus simplex Haldeman	3 oz. per acre give good control.
Mosquito	Culicidae	Heptachlor at 1 part in 40,000,000 gave control of larvae. .05 lb. — .075 lb. per acre gave excellent control. 0.1 lb. in oil gave control of salt marsh mosquito. 1.6 — 2 oz. of heptachlor per acre gave good control of adult mosquitoes.
Narcissus Bulb Fly	Merodon equestris	1 lb. heptachlor in 1 or 2% oil solution gave good control when 3 or 4 applications were made.
Onion Maggot	Hylemyia antiqua (Meigen)	¼ to ½ lbs. heptachlor per acre.
Onion Thrip	Thrips tabaci Lindeman	A spray containing ½ lb. heptachlor per acre gives good control. Wettable powder or emulsifiable concentrates may be applied. Also 10-15 lb. of 2-½% dust per acre may be used.
Plum Curculio	Conotrachelus nenuphar (Herbst.)	3-4 lbs. of 25% wettable powder per 100 gallons of water have given control. 2 or 3 applications may be necessary.
Rapid Plant Bug	Adelphocoris rapidus (Say)	Apply ¼ lb. actual heptachlor as a spray or 2-½% dust per acre per application.
Roach	Blattidae	Concentrations of 0.1% have given 100% kill within 48 hours.
Screwworm	Cochliomyia sp.	A salve containing 0.01% concentration heptachlor gave good control.
Seed Corn Maggot	Hylemyia cilicrura (Rondani)	2 oz. of 25% wettable powder per 100 lbs. of seed have given good control.
Serpentine Leaf Miner	Agromyza pusilla (Meigen)	35 lbs. of 1-½% dust per acre gave excellent control.
Spittle Bug	Aphrophora sp.	2 oz. to 3 oz. per acre applied to alfalfa have given good control.
Sugar Beet Root Maggot	Tetanops aldrichi	4 oz. of heptachlor per 100 lbs. of seed gives good control. Also 2 lbs. actual per acre applied to the soil has given good control.
Sweet Clover Weevil	Sitona cylindricollis (Fabr.)	4 applications of 0.44 lb. heptachlor per acre gave good control.
Tarnished Plant Bug	Lygus pratensis (Linn)	¼-½ lb. heptachlor per acre has given good control of tarnished plant bugs in alfalfa.
Tobacco Flea Beetle	Epitrix parvula (Fabr.)	A 5% dust applied to the plant bed prior to transplanting gave very good control.
Tomato Fruitworm	Heliothis sp.	40 lbs. of 2-½% dust in early season and 60 lbs. of 2-½% dust in late season per acre have given satisfactory control. Also apply 1 lb. per 100 gallons of water at weekly intervals.
Tuber Flea Beetle	Epitrix sp.	Soil application of 10 lbs. per acre gave 100% control. No lower dosages were used for this pest.
Turnip Maggot	Hylemyia sp.	6.3 lbs. of actual heptachlor per acre as a soil treatment gave fair control of this pest.
Western Harvester Ant	Pogonomyrmex Occidentalis (Cresson)	1 to 2 tablespoonsful of 25% wettable powder added to the entrance of the nest gives complete control.
White Grub (June Beetle)	Phyllophaga sp.	4 to 10 lbs. per acre gave good control. Three years control has been obtained by adding 10 lbs. heptachlor per acre to the soil.
Wireworm	Elateridae	Apply 1 to 2 lbs. per acre as broadcast treatment and work into the top few inches of the soil. Spray sugar cane cuttings with 1 lb. in 100 gallons of water at planting time. 4 oz. per 100 lbs. of sugar beet seed using 800 lbs. of seed per acre. This uses 32 oz. of heptachlor per acre.

ARTHUR W. MOHR
N. A. C. President

Past, Present and Future of Agricultural Pesticides Trade Viewed at 19th Fall Meeting of

Natl. Agricultural

PREVIEWING the past and contemplating the future in a well-rounded program, the National Agricultural Chemicals Association was to hold its nineteenth annual fall meeting at the Essex & Sussex Hotel, Spring Lake, N. J., September 3-5.

Problems attending the exportation of pesticides were to be viewed by a panel of experts, led by Wallace S. Moreland, Rutgers University, New Brunswick, N. J. This panel was expected to point out the assets and liabilities involved in exporting and to discuss the economics involved.

In addition to Mr. Moreland, the others to appear on the panel, included John H. S. Barr, vice-president, Pennsalt International Corp.; Earl R. Beckner, chief, Chemicals and Semi-Manufactured Products Branch, Manufactured Products Staff, Office of International Materials Policy, U. S. State Department; P. H. Groggins, Chief, Agricultural Chemicals Section, NPA, U. S. Dept. of Commerce; and Dr. Ralph Stewart, Director, Agricultural Products Division, Office of International Trade, U. S. Department of Commerce.

The panel was to mark the finale of the convention, as a climax to three days of serious discussion.

Earlier speakers were scheduled to present papers on both the broad view of agricultural production and the specific materials needed to bring about greater crop yields. Problems of toxicity were also to be considered. Dr. Clair R. Spealman, chief of the Safety Projects Branch, C. A. A., Washington, D. C., was to talk on "Medical Problems in Airplane Spraying and Dusting"; W. A. Minor, assistant to the Secretary of Agriculture, "Food for the Fifth

NACA's 1952

WEDNESDAY, SEPTEMBER 3

10:00 a. m.
Session in charge of Paul Mayfield, vice-president

10:10 a. m.
President's Address
Arthur W. Mohr, NAC president

10:30 a. m.
"Medical Problems in Airplane Dusting and Spraying"
Dr. Clair R. Spealman, chief, Safety Projects Branch, Civil Aeronautics Administration, Washington

10:50 a. m.
"Food for the Fifth Plate"
W. A. Minor, Assistant to the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D. C.

11:10 a. m.
"Investment in Progress"
Dr. G. D. Humphreys, president, University of Wyoming

11:30 a. m.
"Agriculture's Role in the American Story"
Dr. Paul R. Sanders, Editor, THE SOUTHERN PLANTER

6:00 p. m.
Reception for Members & Guests
Ladies Invited (Dress optional)

9:30 p. m.
Meeting of NACA Board of Directors

THURSDAY, SEPTEMBER 4

10:00 a. m.
Meeting Called to Order
Arthur W. Mohr presiding

10:10 a. m.
"Summary of Pesticide Requirements for 1952-53"
Dr. H. H. Shepard, Staff Specialist, Office of Materials & Facilities, PMA, U. S. Department of Agriculture

10:30 a. m.
Announcements

10:50 a. m.
"Agriculture and Technological Improvements"
Oris V. Wells, Chief, Bureau of Agricultural Economics, U. S. Dept. of Agriculture, Washington, D. C.

Chem. Assn.

LEA S. HITCHNER
Exec. Secretary & Treasurer

PAUL MAYFIELD
N. A. C. Vice-President

Plate"; Dr. G. D. Humphreys, president of the University of Wyoming "Investment in Progress" and Dr. Paul R. Sanders, Editor, "The Southern Planter", Richmond, Va., will present his paper.

Fall Program

10:00 a.m.
"Conservation Programs and Pesticides"
W. W. Dykstra, Assistant to the Chief, Branch of Predator & Rodent Control, Fish & Wildlife Service, Department of Interior

11:30 a. m.
"Merchandising"
Gene Flack, Sales Counsel and Director of Advertising, Sunshine Biscuits, Inc.

7:00 p. m.
Banquet for NACA Members & Guests
Ladies Invited (Dress optional)
(The annual golf tournament is held Thursday afternoon. Chairman of this event is John Rodda. Prizes will be awarded.)

FRIDAY, SEPTEMBER 5
Meeting Called to Order
Arthur W. Mohr President

10:05 a. m.
Annual Report
Lea S. Hitchner, executive secretary and treasurer, NAC Association

10:20 a. m.
"The Bureau of Entomology and Plant Quarantine in 1952"
Avery S. Hoyt, chief, B.E.P.Q., U. S. Dept. of Agriculture, Washington, D. C.

10:40 a. m.
"Meeting the Insecticide Residue Problem"
George C. Decker, Head, Section of Economic Entomology, State Natural History Survey Div., College of Agriculture, University of Ill.

11:00 a. m.
Panel on Exports

Wallace S. Moreland, Rutgers University, New Brunswick, N. J., presiding. Other members of panel:
John H. S. Barr, Vice-president, Pennsalt International Corporation
Earl R. Beckner, Chief, Chemicals and Semi-manufactured Products Branch, Manufactured Products Staff, Office of International Materials Policy, U. S. Department of State
Phillip H. Groggins, Chief, Agricultural Chemicals Section, Chemicals Division, National Production Authority, U. S. Department of Commerce
Dr. Ralph Stewart, Director, Agricultural Products Division, Office of International Trade, U. S. Department of Commerce

Pesticide Requirements

PROJECTING known facts into the next season to estimate pesticide requirements is the assignment given Dr. H. H. Shepard, staff specialist, Office of Materials & Facilities, Production and Marketing Administration, U. S. Dept. of Agriculture.

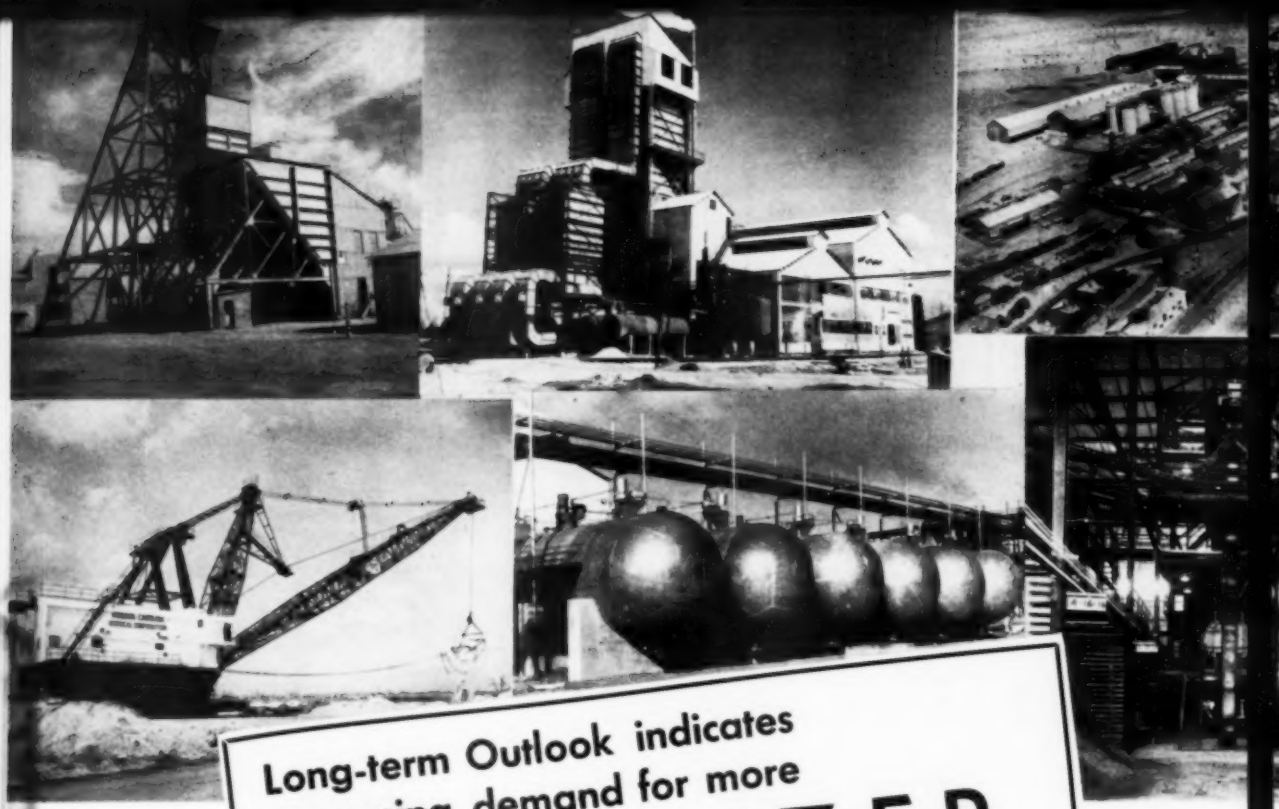
"Agriculture and Technological Improvements", was to be viewed by Oris V. Wells, Chief, Bureau of Agricultural Economics, U. S. Dept. of Agriculture, Washington.

W. W. Dykstra, assistant to the Chief, Branch of Predator & Rodent Control, Fish & Wildlife Service, U. S. Dept. of Interior, was to point out the connections between insecticides, fungicides and rodenticides and conservation. His paper, "Conservation Programs and Pesticides," was scheduled for Thursday.

A talk on "Merchandising" was on Thursday's agenda for presentation by Gene Flack, sales counsel and director of Advertising, Sunshine Biscuit Co.

The annual NAC banquet is scheduled for Thursday evening. No formal speeches were on the program for that time, according to the advance program.

Golf was to be the order of the day for Thursday afternoon, time of the annual tournament. Prizes were to be awarded following the completion of the contests.★★



Long-term Outlook indicates increasing demand for more FERTILIZER

"FERTILIZER, applied scientifically and used with other fruitful farming practices, is a cornerstone of the welfare of the nation. It is the one single method above all others that will permit farmers to meet our bigger future needs. Without more of it, the job cannot be done." This was one of the significant statements contained in a paper "Fertilizer Resources and Requirements of the United States," prepared by the U.S.D.A., the TVA and the U. S. Department of Interior, in the President's Materials Policy Commission report for 1952.

The following is a condensation of the report:

Looking ahead beyond the immediate years and into the future 25 years, the United States has the prospect of providing food and fiber for about 40 million more people than the 150 million figure of 1950.

Should the years through 1975 be peaceful, the U. S. will need much more food and fiber than today because of its growing population. Each year brings from 2 to 2½ million more persons to feed and clothe. By 1975, it is probable that our population will have reached 190 million.

On the other hand, if the next quarter-century is marked with international turmoil, farm production requirements will be even greater.

How will this tremendous production be achieved? New lands for cultivation no longer exist . . . The transition from horses to tractors on farms has provided more than 70 million acres in past years, but the change-over is now practically complete and further acres from this source are relatively negligible. This means that the bulk of future farm production — for the next 25 years or the next 100 — must come from land already under cultivation. Thus, fertilizers become the key to this production.

Fertilizer Ups Production

JUDGING by the amount of food and clothing required to support the 1950 population of 150 million, it will take about 40 percent more farm production to support 190 million Americans in 1975 at a high standard of living. Under the best conditions, in order to produce enough to meet the national need, farmers will need by 1975, more than 2½ times the 4 million tons of the primary plant nutrients (nitrogen, phosphate, and potash) contained in

the 18.5 million tons of commercial fertilizers which farmers used in the crop year 1950.

The use of fertilizers for supplying plant nutrients to increase farm crop yields produces results. When used under suitable conditions and in conjunction with other desirable practices — provided moisture and other climatic conditions are favorable — fertilizer can bring about a greater increase in production of all crops than any other single influence. It is the key to the tremendous food and fiber production required in the future.

Most crops in all areas of the United States do not get enough needed nutrients from the soil and other natural sources to permit them to grow into their full productive power. Depending upon the type of ground in which they are planted, crops usually lack one or more of the three primary plant nutrients: nitrogen, phosphate, and potash (N, P_2O_5, and K_2O, respectively). Many also lack secondary nutrients, such as sulfur, calcium, and magnesium and so-called trace elements, like boron, copper, manganese, and zinc. Fertilizing the soil with these nutrients in scientifically-determined proportions provides crops with well-balanced diets.

In order to produce maximum results, the use of fertilizer must be supported by use of other beneficial farm production practices, such as rotation planting, contour plowing, and improved seed along with adequate manpower and machinery and pest control. But the best combination of other practices will not provide the necessary farm production unless enough fertilizer is supplied.

The historical pattern of increased per-acre yields indicates that increased fertilization of crops and improvement in other practices are likely to take place more or less together. If past relationships between increases in farm output and increases in the use of fertilizer are projected toward a further increase of 40 percent in farm output, farmers would use more than 2½ times as much tonnage of plant nutrients as they do at present. It should be noted that a large portion of an increase in fertilizer use will go to maintain present levels of yield alone.

In recent years, farmers have increased their use of commercial plant nutrients at an annual rate of about 10 percent. If this rate is projected forward 20 years, the quantities used by that time would be four times those used now. Even with no improvement in other practices, such a level of use might result in nearly a 75 percent increase in farm output. Even though the response were that great, if it develops that a healthy economic balance would be reached with a 40 percent increase in output, it appears unlikely that the use of fertilizer will reach that level.

Effects on Certain Crops

FOUR major crops, each in selected states, corn, cotton, vegetables, and hay and pastures — received nearly 60 percent of the total farm use of the three primary plant nutrients in 1950. They are used as the basis for estimating the total quantities of plant nutrients required and the total production that would result from application of the most profitable rates. Theoretically, if the factors involved in increasing yields were improved commensurate to maximum practicable fertilizer use, current total farm production could be trebled. Obviously, such results are unattainable as national totals, although a few of the more progressive farmers may attain comparable results in special instances.

Corn — a key crop in expanding meat production — is the outstanding example of how farm output can, through fertilizer, be pushed practicably up to the level of future food and fiber requirements. About one-fourth of all commercially produced

plant nutrients used on all crops in the United States is applied to the corn crop. And about 40 percent of that is used in the Corn Belt and Lake States. Preliminary estimates indicate that Iowa farmers could practically boost corn production per acre from the current average of 49 bushels to 60 bushels by doubling the amount of plant nutrients they now use and by improving other farming practices about 50 percent. They could increase production to an average of 75 bushels an acre by doubling once again their plant nutrient application and improving their good farming practices by another 50 percent.

A similar situation is possible in cotton which uses about 10 percent of all fertilizer applied. Estimates thus far developed show that the average yield of seed cotton in North Carolina, for example, could be increased from the 1949 average of 729 pounds per acre to 1,250 pounds. This would be possible by increasing the amount of plant nutrients used on the crop from the 1949 average of 112 pounds to about 150 pounds together with about a 50 percent improvement in other practices. Another 200 or 300 pounds could be added to the yield if fertilizer application were further increased to approximate more nearly the 50 percent increase in other practices.

About 11 percent of all plant nutrients are applied on hay and pasture in the United States. Estimated response of legume-grass hay and pasture to fertilizer in New York State indicates that the current average yield is little more than one-third of the yield that could be obtained. The yield of these crops could be increased by going half way toward the most profitable rates of application and making about a 50 percent increase in other practices. This would mean an application of about 100 pounds of plant nutrients per acre. Production of vegetable crops which also receive about 11 percent of all primary plant nutrients used, could be increased about a fourth with more fertilizer.

It is emphasized that the foregoing estimates of over-all use of plant nutrients and resulting production at different rates of application are preliminary and subject to substantial revision as continuing research dictates. The large increases in production that would result from much greater use of fertilizer underscores the need for encouragement of balanced production programs. Over a period of 25 years improvements will surely be made in other known practices and more important unforeseen developments will no doubt occur. Therefore, the quantities of fertilizer needed to support estimated production levels 25 years hence will depend not only on the extent of further adoption of other known practices, but also on new developments in farm technology.

Table I

Commercial fertilizer and primary plant nutrients consumed in the United States and Territories in selected years: 1900-1950

Calendar year	Fertilizers	Plant-nutrient content			Total content	
		Nitrogen (N)	Available phosphoric oxide (P_2O_5)	Potash (K_2O)	Quantity	Proportion
	1,000 *short tons*	1,000 *short tons*	1,000 *short tons*	1,000 *short tons*	1,000 *short tons*	*Percent*
1900	2,730	62	246	86	394	14.4
1910	5,547	146	499	211	856	15.4
1920	7,296	228	660	258	1,146	15.7
1930	8,425	377	793	354	1,524	18.1
1940	8,656	419	912	435	1,766	20.4
1950	19,758	1,126	2,071	1,215	4,412	22.3

Source: U. S. Department of Agriculture.

Fertilizer Use Increases

FERTILIZING to encourage bigger and better crops dates back before the earliest colonial settlers arrived. The colonists adopted this method of bettering crops along with other local sources of fertilizer such as animal and plant residues, lime, and marl. In the nineteenth century the foundation was laid for the United States commercial fertilizer industry upon then current fundamental advances made in the science of plant nutrition. The production of commercial fertilizer in the United States grew from about 32,000 short tons in 1859 to nearly 3 million tons in 1899, and on to a new record high of about 19.8 million tons in 1950. This tremendous amount of commercial fertilizer, in addition to manure and lime and other soil-improving materials, played a major role in the near-record 1951 all-crop production volume.

During the last 50 years, the manufacturing processes and the characteristics and types of fertilizer materials and mixtures underwent important changes. Natural organic materials, were superseded largely by chemical products, and liquid fertilizers came into use. The primary plant-nutrients in the fertilizer materials and mixtures used in the country have doubled in the case of certain materials. Marked improvement was made in the physical condition of the materials, in mixtures, and in their packaging.

The United States has become largely self-sufficient in the supply of the three primary plant nutrients, nitrogen, phosphate, and potash. The country now leads in production of nitrogen and phosphate fertilizers. Production of potash is exceeded only by that of Germany.

The 1950 consumption of fertilizer was 128 percent higher than in 1940 and over 7 times the consumption in 1900, while the total use of the 3 primary nutrients in 1950 was 150 percent more than in 1940 and over 11 times the use at the beginning of the century (see table I).

The record 1950 use of commercial fertilizer was the twelfth consecutive year of increase. The pro-

duction of nitrogen and potash each more than doubled in the last 7 years, while production of phosphate doubled in the last 10 years. Even so, supplies were short of demand in most of the years. Great progress also has been made in the use of soil-liming materials. The total consumption of liming materials in 1950 was 26.5 million tons, or more than 8 times that of 1935. (See table II.)

A large tonnage of liming materials is required to maintain a satisfactory status of lands that have been limed. Holding existing gains and making further improvement of the lime status of agricultural soils in this country would require an annual application of nearly 80 million tons of liming materials. But this level will not be attained without extraordinary educational crop production campaigns.

At the turn of the century, little or nothing was known of the plant requirements for the trace elements, but the need for applying small quantities of these elements to various crops in many parts of the country is now being recognized.

The greatly accelerated increase in consumption of fertilizer and plant nutrients in recent years has been influenced by many factors. These include: (1) the urgent need for additional food and fiber to meet domestic and export needs, (2) the greatly improved economic position of the American farmer, (3) the continued decline in the native fertility of large areas of the nation's soils, and (4) a more general recognition of the potentialities of fertilizer in lowering production costs and increasing crop yields.

Table II

Consumption of agricultural liming materials on farms of the continental United States in selected years: 1930-50

Calendar year:	1,000 short tons
1930	3,498
1935	3,292
1940	13,434
1945	22,357
1950	26,536

Sources: National Lime Association and Agricultural Limestone Institute.

Table III

Distribution of commercial-fertilizer consumption in the continental United States by principal crops 1929, 1942, 1949, 1950

Crop	Percent of total fertilizer consumption		
	1929	1942	1950[1]
Corn	20.7	22.0	24.8
Cotton	28.0	14.6	9.0
Small grains	13.8	14.1	18.4
Tobacco	6.8	5.3	4.1
Potatoes	8.5	7.1	4.2
Hay and pasture	2.1	12.9	12.4
Vegetables[2]	6.7	10.4	7.6
Fruits	4.3	6.7	4.2
Other crops	9.1	6.9	15.3

[1]Year ended June 30.
[2]Includes sweetpotatoes.
Sources: National Fertilizer Association and U. S. Department of Agriculture.

While it is not possible to make trustworthy estimates of the extent of the gap between fertilizer supply and quantities farmers would buy at prevailing prices, it is known that annual demand was not met during the last 10 years. Major reasons for failure to meet demand include: (1) lack of sufficient manufacturing and processing facilities and the difficulty of expanding existing facilities, (2) necessity for shipping large quantities of plant nutrients to allies and to occupied countries, and (3) shortages of some chemicals essential for fertilizer manufacture.

The greater proportion of the total annual consumption of commercial fertilizer in the United States is in the form of mixtures — ranging from 67 to 70 percent of the total during the last 8 years. Of the primary nutrients, more than 90 percent of the potash, about 70 percent of the phosphate, and 50 to 60 percent of the nitrogen applied as commercial fertilizer are used in mixtures.

Use Varies in Sections

As one would expect, the consumption of fertilizer varies considerably among the different regions of the country. For many years the South Atlantic and Gulf States, which generally are low in native soil fertility, have accounted for a large portion of the annual consumption. Consumption has greatly increased, however, in other regions, notably the North Central States where soil fertility originally was much higher than in the southerly regions.

In 1933-34 the South Atlantic region used 50 percent of the fertilizer nitrogen used in the United States, while the North Central region used only 4 percent. In 1949-50, however, the respective figures were 29 and 15 percent. The growing need for nitrogen in the North Central region is indicated by the fact that the consumption of this nutrient in 1949-50 was 14 times the consumption in 1933-34. The proportionate increase in the Western region was even larger.

The South Atlantic region also has yielded to the North Central region as the leader in potash consumption. The consumption in the latter region in 1949-50 was about 12.5 times that of 1933-34.

For many years fertilizers were used chiefly on such cash crops as cotton, tobacco, potatoes, and vegetables. The need for a better balance in the production of food, feed, and fiber has been a major factor in alternating the distribution of fertilizer consumption by crops. (See table III.)

The long-range shift in production is toward more grassland farming, a development supported by the United States Department of Agriculture and the Land Grant Colleges. The continuing grassland program is designed to make better use of soil resources and to improve their management so that each acre may contribute more fully to the total

agricultural production while building the soil for future output. Future trends with reference to grassland farming will have an influence on total and regional use of fertilizer, and on the relative quantities of the different plant nutrients needed.

Fertilizer Expenditures

COMPARATIVE responses in yields and relative costs of the different combinations determine the farmer's final choice, provided he is well-informed on these matters. While much progress has been made, too many farmers are still not aware of advantages to be gained from increased use of fertilizer.

In 1949, farmers spent nearly 700 million dollars for fertilizer; 3.9 percent of the total agricultural production expense of farm operators in that year. In the past 38 years farmers spent for fertilizer an average proportion of 3.4 percent — ranging from 2.5 percent to 4.8 percent—of their total annual production expense.

The 700 million dollars farmers spent for fertilizer in 1949 was 4.4 times as much as they spent in 1911. During the same period, their total production expenses increased 4.9 times.

The proportion of the farmer's income spent for fertilizer varies greatly. It is generally much higher in the older fertilizer-consuming States than in the newer areas of use, however.

Fertilizer Materials

FUTURE demands on raw materials for fertilizer production are so great that we must seek better methods of using our known resources and probe for additional sources as well.

The only fertilizer raw material that is inexhaustible is nitrogen, which exists in the atmosphere. While other sources of nitrogen for fertilizer exist — the fixation of nitrogen synthetically from the atmosphere is the most important source, furnishing more than 65 percent of the annual consumption. This source of nitrogen is limited only by available production facilities required in fixation. Facilities were inadequate to meet 1952 demand, but the long-term trend looks optimistic.

The United States produces nearly half of the world output of phosphate rock, and the reserve is exceeded only by that of French Morocco. In the calendar year 1949, phosphate rock supplied more than 98 percent of the 1,884,000 short tons of the phosphate fertilizer used by farmers.

The present economically minable reserve of phosphate rock in the United States totals about 4 billion long tons; potentially minable reserves total at least 9 billion tons.

By virtue of the development of extensive potash deposits in New Mexico, this country has been substantially self-sufficient in supplies of this essential plant nutrient since 1940. The domestic use of potash is predominantly for fertilizer; 93 percent is used for fertilizer, 7 percent for chemicals.

The Nation's proved reserves of potash economically recoverable under present conditions are located in the New Mexico deposits and in the brines of Searles Lake in California and Salduro Marsh in Utah. While current estimates of minable potash indicate reserves of more than 200 million tons, future fertilizer demands for this material require a broad search for and development of potash resources and research on utilization of lower grade materials. The United States holds large resources of certain secondary fertilizer materials.

Facilities Must Expand

EXPANSION of present manufacturing and processing facilities is vital to make plant nutrients available at increasing rates. Fuller use must be made of existing facilities. In the case of the primary nutrients, generally the capacity for producing these has not kept pace fully with the demand.

A major problem is to increase nutrient-producing capacity to meet present demand and to insure continued expansion as needed in the future.

Despite progress in manufacturing processes and techniques, there is room for great improvement. Research and development in this field must be expanded and accelerated.

Future efforts should be directed toward production of a larger portion of the nation's fertilizer nitrogen requirements in the form of high-analysis, solid products, such as ammonium phosphate and especially urea, the most concentrated of the solid nitrogen fertilizer materials.

Lack of adequate supplies of concentrated phosphates is a major obstacle to expanded production of high-analysis fertilizers.

More than 90 percent of the available phosphates used as fertilizer is produced by processes involving treatment of phosphate rock with sulfuric acid. While plentiful supplies of sulfur have been available in recent years, a current serious shortage must be overcome to support increased phosphate fertilizer production. This can be done by discovery of new sources of sulfur, but perhaps more practically by developing known methods of producing phosphate fertilizers without the use of sulfuric acid, or at least with less of it. Use of nitric acid for treatment of phosphate rock should be developed as one of these methods.

Future increases in the use of fertilizer can be mostly independent of foreign sources of supply. A continuing increase in the domestic manufacture of plant nutrients will help guarantee the nation plentiful food and fiber in the future.

Out of the total domestic fertilizer nitrogen supply of 1,387,00 short tons in 1950-51, domestic sources supplied 1,098,000 tons, while imports totaled 289,000 tons. During the same period, the United States exported 102,000 tons. Expansion in nitrogen fertilizer production, especially by the synthetic ammonia process can provide the United States with required supplies.

The United States traditionally exports much more phosphate rock than it imports. In 1950, exports totaled 1,832,000 long tons, compared with imports of 87,000 tons. During that year, the United States used about 8,509,000 tons of

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Residues of

Dithiocarbamate Fungicides

—on food crops

by

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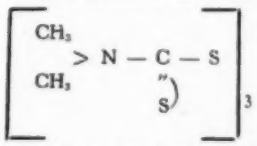
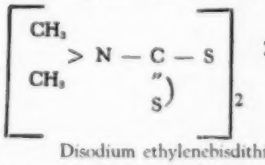
DURING the 1930's an interesting pattern of biological activity was revealed through investigations with derivatives of dithiocarbamic acid by Tisdale and Flenner[6]. Since then, the fungicidal properties of the metal salts of dithiocarbamic acid have achieved outstanding importance, and there are in wide use four derivatives with the twin advantages of control of a great variety of plant diseases and low phytotoxicity. These compounds are:

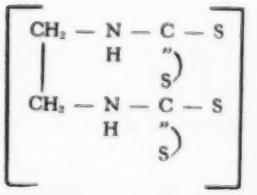
Ferric dimethyldithiocarbamate (assigned generic name: ferbam)



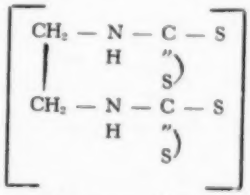
Zinc dimethyldithiocarbamate (assigned generic name: ziram)



Disodium ethylenebisdithiocarbamate (assigned generic name: nabam)



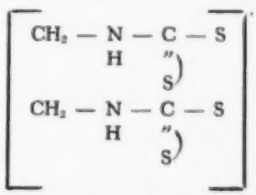
Zinc ethylenebisdithiocarbamate (assigned generic name: zineb)



All the compounds listed, except nabam, are essentially water-insoluble, and are used as dusts or sprayed as wettable powders. The soluble dithiocarbamates, including nabam, are quite phytotoxic. Nabam is not applied as such to crops, but is combined with zinc sulfate to form a tank-mix precipitate of the insoluble zinc salt or zineb.

Recently, a new member of the dithiocarbamate fungicide family has reached the market. This product is:

Manganese ethylenebisdithiocarbamate (abbreviation: MnEBD)



Like zineb, the manganese salt is only slightly soluble in water. It is available as "Manzate"* fungicide.

Uses for Manzate

INITIAL recommendations for "Manzate" fungicide are to control early blight and late blight of potatoes and the five major fruit and foliage diseases of tomatoes. Additional research is being conducted on other promising applications, including diseases of celery, carrots, cucurbits, cabbage, onions, spinach, apples, peaches and raspberries.

The extensive commercial applications of the older dithiocarbamate fungicides are evidenced by many hundreds of favorable references during the Food and Drug Administration's Residue Tolerance Hearings[8] in 1950. Their usefulness was outlined in part by Tisdale[5] as follows:

"Ferbam is especially useful in the field of fruit disease control. For the control of apple rust and quince rust it has no equal. Under many

*Trademark of E. I. du Pont de Nemours & Co. (Inc.) for its fungicide based on manganese ethylenebisdithiocarbamate.

Table 1

Dithiocarbamate Residue Results Classified By Range

Range in Parts per Million	Percent of All Residue Results
0—1 p.p.m.	64.9%
1—5	23.4
5—10	8.2
Over 10	3.5

Table 2

Effect of Number of Treatments On Dithiocarbamate Residue Levels

Active Ingredient	Crop	Location	Elapsed Time* (Days)	No. of Treatments	Residues (p.p.m.)
Zineb	Cabbage	Ohio	21	6	1.2, 0.9
			21	1	1.8, 1.5, 0.6
Zineb	Tomatoes	Ohio	21	6	0.15, 0.15 0.22
			21	1	0.13, 0.18
Zineb	Tomatoes	Florida	8	19	0.7
			5	8	0.6

*Between final application and harvest

conditions it is a superior product for the control of apple scab, especially on the fruit. Pear scab is very effectively controlled with ferbam. Ferbam is considered a superior product for the control of brown rot and leaf spot of sweet cherries. (It) is the preferred treatment for several important diseases of small fruits.

"Ziram has found its greatest uses in the field of vegetable crop disease control. Outstanding uses are the control of tomato anthracnose and the early blight of tomato and potato. It is effective for the control of such cucurbit diseases as anthracnose and downy mildew.

"The outstanding use of zineb and the nabam-zinc sulfate combination is for the control of late blight of potatoes and tomatoes. It also controls early blight and other leaf infections of these crops. The early and late blights of celery also are effectively controlled. Other diseases controlled with zineb and nabam are downy mildew and white rust of spinach, rust of beans and onion purple blotch."

Rate of Application

THE rate and frequency of application of these fungicides varies with the crop, the plant disease, the product, and local conditions. Several applications are usually made per season at intervals of five to fourteen days.

Concentrations generally vary between 1 and 3 pounds of wettable powder formulation (65 to 76% active ingredient) per 100 gallons of spray mixture, or 5 to 15% dusts. Nabam is normally used at a rate of 2 quarts (19% nabam) per 100 gallons of spray along with ¾ lb. of monohydrated zinc sulfate or 1 lb. of flake zinc sulfate.

Sprays are applied to tree fruits at gallonage rates sufficient for adequate coverage and to truck crops at 100-200 gallons per acre, while dusts are normally used at 30 to 50 pounds per acre. Resulting rates of application of active ingredients, using truck crops as an example, are in the order of 1.5 to 7.5 pounds per acre for a single treatment.

Residue Data

RESEARCH has been conducted by the du Pont Company and other agencies to determine crop residues of ferbam, ziram and zineb[3], as well as residue data for the newer MnEBD.

Results of residue studies on eight fresh fruits, eight fresh vegetables and three canned foods indicate that: (1) initial deposits are relatively low; (2) residues weather rapidly; (3) final residues are relatively independent of the number of treatments or rate of application; (4) residues are reduced by washing or processing; and (5) harvest-time residues are generally very low, even where commercial spray schedules involving repeated applications were employed.

Ninety-six percent of all results are less than 10 p.p.m. (parts of the dithiocarbamate fungicide per million parts by weight of treated fruit or vegetable), as shown in Table 1. Almost 260 individual results, excluding replicated determinations, have been obtained.

The number of treatments evidently has little effect on the harvest residue levels. This is shown in the, Table 2 above cited from a paper by Lowen[4].

The evidence that final residue is relatively independent of the number of treatments or rate of application is apparently due to the rather rapid degradation of dithiocarbamate deposits by ordinary processes of weathering. This reduction in residue level is demonstrated in Figure 1. It may be noted that all residues in excess of 5 p.p.m. appeared on samples taken within seven days following the last application.

The type of surface and the ratio of surface area to mass of the fruit or vegetable are factors influencing the magnitude of residues. As expected, residues are lower on smooth-surfaced, bulky fruits and vegetables than on fruits and vegetables which are fuzzy, leafy or small in size. For example, fresh green beans and celery leaves have exhibited the highest residual deposits in these studies.

The maximum residue found on tomatoes treated with "Manzate" fungicide is 1.3 p.p.m. MnEBD. For peppers — smooth surfaced, but less bulky than tomatoes — residues immediately following applications have varied between 3.2 and 5.2 p.p.m. MnEBD, but these levels declined to less than 1 p.p.m. within a few days. The relatively high residues on celery are reduced by stripping, trimming and washing. Pascal celery showed 8.0 p.p.m. MnEBD and Golden variety 6.3 p.p.m. upon stripping and trimming; both varieties had been sampled one week after the last of 12-15 treatments with "Manzate" fungicide.

Washing these same celery samples by conventional commercial procedures reduced the residue to 1.75 p.p.m. for the Pascal and 2.80 p.p.m. for the Golden variety. To date, "Manzate" fungicide has demonstrated notably promising control of Cercospora and Septoria blights of celery and tests are continuing.

Considerable residue work on "Manzate" fungicide has been conducted with tomatoes, since this product appears to be an excellent single fungicide for control of the major foliage and fruit diseases of tomato—early blight and late blight, anthracnose, gray leaf spot (stemphylium), and Septoria leaf spot. The results of these studies shown in Table 3, demonstrate the low residue levels even for samples taken immediately after treatment.

Washing experiments on several crops indicate that dithiocarbamate fungicide residues are reduced, but not eliminated by this operation. Higher residues were more greatly reduced percentagewise than were lower levels. Spot-checks on canned fruits and vegetables to ascertain the effect of processing and canning revealed no residue in excess of 0.4 p.p.m.

A selected list of residue data for the five dithiocarbamate fungicides on ten different crops is presented in Table 4 in order to portray actual harvest-time residues resulting from conventional protective fungicide treatments. In all cases, the data are for samples subjected to more than one application, at rates used according to recommended grower practice. Intervals between the last application and sampling or harvest also depended upon conventional procedure, with a full month interval in the case of cherries, while ranges in tomato and pepper results represent the differences between samples at 6-7 days and those at 0 days.

For the important uses of dithiocarbamate fungicides listed in Table 4, it is indicated that crop residues of these materials at harvest are low in magnitude.

Sampling Procedures

THE attempt was generally made to obtain at least a 5-lb. random sample of the treated crop (or a random composite of replicated treatments); also an untreated sample for use as a control, or in any special analytical studies required for that crop.

These samples were usually shipped in paper grocery bags as the inner containers along with empty bags for use as blanks in the determination. Shipments by air express and refrigeration on receipt of the sample

Table 3

Residue Levels, "Manzate" Fungicide on Tomatoes

Interval Between Last Appln. & Sampling	Interval Between Sampling and Analysis	Dosage Lbs. per 100 Gals.	Rate of Appln. Gal. per Acre	No. of Applns.	Residue Level as P.P.M. of MnEBD	Location
15 min.	2 days	2	150	1	1.3	Texas
30 min.	7 days	2	150	1	0.5	Florida
1 hour	4 days	2	150	1	0.6	Florida
1 hour	4 days	2	250	1	0.8	Florida
3 hours	4 days	2	200	1	1.05	Florida
7 days	4 days	2	200	1	0.09	Florida
6 days	2 days	1½	150	7	0.07	Delaware
5 days	5 days	1½	170	16	0.3	Florida
"0 days"	5 days	1½	170	17	0.4	Florida
7 days	7 days	1½	170	19	0.08	Florida
"0 days"	7 days	1½	170	20	0.4	Florida

Table 4

Harvest-Time Crop Residues of Dithiocarbamate Fungicide

Crop	Fungicide	Residue in P.P.M.
Apples	Ferbam	0.05
Cherries	Ferbam	3.6 (Fresh)
		0.09 (Canned)
Grapes	Ferbam	0.25
Cucumbers	Ziram	0.45
Celery	Zineb (from Nabam)	1.45 (unwashed)
		0.72 (washed)
Potatoes	Zineb (from Nabam)	0.0
Tomatoes	Zineb (from Nabam)	0.7 to 2.1 (unwashed)
		0.15 to 0.6 (washed)
Cabbage	Zineb	0.14 (head wt. basis)
		1.05 (leaf wt. basis)
Cucumbers	Zineb	0.1
Celery	MnEBD	1.75 to 2.80 (stripped, trimmed & washed)
Peppers	MnEBD	0.16 to 5.2 (unwashed)
		0.0 to 0.09 (washed)
Squash	MnEBD	0.5 (unwashed)
		0.07 (washed)
Tomatoes	MnEBD	0.07 to 1.3

have been the rule. Although it has not always been possible, the goal has been to avoid excessive hold-up of samples before analysis, through scheduling of shipments and availability of analytical manpower. Results of this concerted effort are evident in Table 3, wherein the maximum delay between sampling in the field and analysis in the laboratory for MnEBD residues on tomatoes has been 7 days.

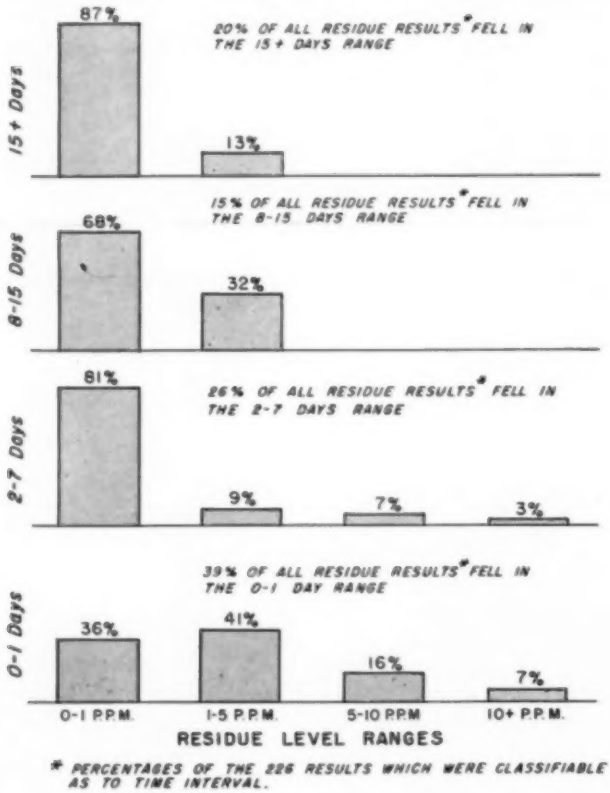
Different techniques of handling samples for analysis were found desirable under varying circumstances. For foods with smooth surfaces and low surface-volume ratios, such as apples, the residue was removed from the sample with a solvent, and the residue then isolated for analysis by evaporation of the solvent. It was found necessary to macerate leafy vegetables such as cabbage and spinach into a homogeneous pulp and conduct the analysis directly in this medium. In certain other instances, especially with zineb and MnEBD (because of limited solubility in suitable solvents), the residue was removed from the sample by a water wash containing a small amount of wetting agent; the washings were then analyzed directly.

The method described by Lowen[4] was primarily used in analyzing the treated crops for ferbam, ziram, zineb, (zineb is the active principle of nabam since nabam is used with zinc sulfate) and MnEBD. In this method, which is a modification of the Dickinson-Viles[2] procedure, the active ingredients decompose to carbon disulfide upon treatment with acid and heating. The carbon disulfide is absorbed in a copper acetate—diethylamine reagent and the resulting copper diethyl dithiocarbamate is determined colorimetrically.

Acknowledgment. Grateful acknowledgment is made to the many state and federal investigators who cooperated in providing samples, and to W. K. Lowen, H. M. Baker, field agricultural research and development personnel, and D. A. Carlson, all of du Pont, for analytical work, provision of samples, and compilation of residue data. ★★

Figure 1

THE EFFECT OF TIME INTERVAL BETWEEN LAST APPLICATION & SAMPLING ON DITHIOCARBAMATE FUNGICIDE RESIDUE LEVELS



* PERCENTAGES OF THE 226 RESULTS WHICH WERE CLASSIFIABLE AS TO TIME INTERVAL.

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(2) Anon., Am. Phytopath. Soc., "The Present Status of Chemicals Used to Control Diseases of Edible Fruits and Vegetables in the United States," U. S. Food & Drug Admin., Tolerance Hearings, FDC-57, 1950, Exhibit 787.

(3) Dragt, G., "Method of Analysis for Fungicides in Crop Residues (Dickinson-Viles' Method)", U. S. Food & Drug Admin. Tolerance Hearings, FDC-57, 1950, Exhibit 1012, Part E.

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(5) Tisdale, W. H., "Derivatives of Dithiocarbamic Acid as Fungicides," U. S. Food & Drug Admin. Tolerance Hearings, FDC-57, 1950, R-6305-9.

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Of particular importance at present, is study of toxic residues on food crops. How to determine the amount of fungicial residue is viewed as fundamental

Cary, Hart, Vernon Upped in Food Machinery Corp. Shifts

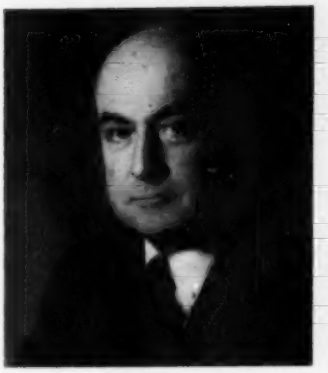
THE Board of Directors of Food Machinery & Chemical Corporation has announced important changes in the firm's corporate management. J. B. Cary, San Jose, California, formerly executive vice-president, was elected chairman of the Executive Committee of the corporation and will share with the president, Paul L. Davies, responsibilities of overall supervision.

In 1947 Mr. Cary, then president of Niagara Chemical Division, Middleport, N. Y., was made executive vice-president of Food Machinery and Chemical Corporation and moved to San Jose. At that time, Ernest Hart assumed the duties of president of Niagara, which position he has held to this date. Mr. Hart was elected executive vice-president of the corporation and will be responsible for the supervision of operations of its chemical divisions. These include Niagara Chemical Division, Middleport, New York; Westvaco Chemical Division, New York City; Ohio-Apex Division, Nitro, West Virginia; and Buffalo Electro-Chemical Company of Buffalo, New York. Mr. Hart will make his headquarters in the new Chrysler Building East in New York City. However, he will continue to maintain his residence in Medina, New York. Both Mr. Cary and Mr. Hart are past presidents of the National Agicultural Chemicals Association.

Benjamin C. Carter, a former vice-president and controller of the corporation, was elected executive vice-president in charge of the mechanical divisions of Food Machinery and Chemical Corporation and will continue his headquarters in San Jose, California.

Succeeding Mr. Hart as president of Niagara Chemical Division is Jackson V. Vernon, who has been Division vice-president and sales manager since 1947. Mr. Vernon is a graduate of Mississippi State College. After serving a short time with the Mississippi State Plant Board and the U. S. Department of Entomology, he joined the Niagara sales organization in 1923 as assistant territory manager, operating in the Memphis, Tennessee area. In 1925, he was transferred to the midwest area to develop the company's business in that section on fruits and vegetables. In 1933, he became district sales man-

(*Turn to Page* 117)



JOSEPH B. CARY
New Chairman of Food Machinery & Chemical Corp. Executive Committee

* * *

ERNEST HART
Named executive vice-president Food Machinery & Chemical Corp.

B. EARLE VOSTEEN
Controller & vice-president, Niagara Chemical Div.

STUART H. BEAR
Vice-president and sales manager Niagara Chemical Div.

JACKSON V. VERNON
Named president of Niagara Chemical Division, succeeding Mr. Hart

Entire industry invited to participate in October

Fertilizer Safety

OCTOBER 22-23 are the dates set aside for the second annual meeting of the Fertilizer Section of the National Safety Congress to be held at the Sheraton Hotel, Chicago, Illinois. According to the advance schedule, a program of unusual interest has been planned, with an urgent invitation extended to the entire fertilizer industry.

General chairman J. S. Fields, safety director, Phillips Chemical Co., Bartlesville, Okla. is to open the fertilizer safety section of the congress with a talk outlining the general objectives of the body, and a report on progress made during the past year.

The subject of multiple shot blasting in fertilizer storage will be discussed by Mark Withey, explosives expert, Trojan Powder Co. He is expected to answer questions from the floor regarding the safe practices of blasting and to explain techniques involved in the "delayed action" charges now being used in fertilizer plants to reduce hazards from powerful single-shot blasts.

J. L. Rosenstein, head of the Department of Psychology, Miami University, will discuss that phase of safety, describing the employees' mental processes and attitudes which enter the safety picture. His title will be, "Why Safety."

How the proper designing of fertilizer plants may aid fire prevention will be described by G. G. Blair, fire prevention engineer of Ebasco Services, Inc. Following his talk, the meeting will be thrown open for questions and further discussion.

A practical demonstration of how multiple shot blasting aids the manufacturer in breaking up safely a hardened pile of material, is scheduled for Saturday morning, October 23. Mr. Withey will set off an actual blast at the Chicago Heights plant of International Minerals & Chemical Corporation. The spectators will be taken to the scene in special buses, according to current plans.

In the afternoon, Mr. Fields will preside at an election of officers, followed by a talk by John E. Smith, safety director, Spencer Chemical Co., Kansas City, Mo., on "1953 Goals for the Fertilizer Section."

Having returned to the hotel after witnessing the multiple shot blasting at Chicago Heights, the

JOHN SMITH
To speak on 1953 goals for fertilizer safety

Conference

Fertilizer Safety Section of the National Safety Congress plans big two-day event October 22 & 23 with headquarters at the Sheraton Hotel, Chicago. Safety leaders anticipate crowd larger than that of 1951.

crowd will discuss with Mr. Withey the methods he uses and further questions regarding his technique.

E. O. Burroughs, Jr., manager of the Insurance Department of F. S. Royster Guano Co., Norfolk, Va., will speak on "Housekeeping in Fertilizer Plants," pointing out how necessary it is to maintain neatness and orderliness in a plant if maximum safety is to be realized.

The hazards encountered from gas and dust in fertilizer plants will be discussed by Herbert Walworth, Lumberman Mutual Casualty Co. How to control both dust and gas in a plant will be the topic of his talk Saturday afternoon.

Thomas J. Clarke, Personnel Manager, GLF Exchange, Ithaca, N. Y., will talk on the importance of safety meetings in a plant, under the general subject of "How to Conduct a Safety Meeting."

Mr. Blair is scheduled to present a talk on "Fire Prevention in Fertilizer Plants Through Maintenance" as the final item on the afternoon's program.

Last year's program in Chicago attracted several times the number of persons expected to be in attendance and the program committee for 1952 is anticipating a large crowd. Representatives of every fertilizer plant are urged to be present.

A. B. PETTIT
Behind-the-scenes booster for fertilizer plant safety

JACK FIELDS
General chairman of fertilizer safety section

E. O. BURROUGHS, JR.
To explain importance of good housekeeping practices

A. O. A. C., Feed, Fertilizer and Economic Poisons

Control Officials

To hold annual meetings in Washington, Sept. 29-Oct. 4

FOUR important groups of agricultural chemical control officials will hold a week-long series of meetings at the Shoreham Hotel, Washington, D. C., September 29 through October 4. The participating groups are, the Association of Economic Poisons Control Officials; the Association of Official Agricultural Chemists; Association of American Feed Control Officials; and the American Association of Fertilizer Control Officials.

AOAC Leads Off

THE AOAC will hold a three-day session beginning September 29, according to K. L. Milstead, secretary-treasurer of the Association. Details of the program were not complete at press time, but Mr. Milstead said that papers will be presented on the application of flame photometry and on the determination of potassium in fertilizers and sodium in foods. Dr. C. H. Kunsman and his colleagues, Western Regional Research Laboratory, U. S. Department of Agriculture, will also present a paper, "Moisture Determination of Foods by Hydrogen Nuclei Magnetic Resonance."

Henry A. Lepper, AOAC president, will present his address on Monday afternoon, September 29; and the next afternoon, Dr. L. A. Maynard, Cornell University School of Nutrition, will speak on "The Import of Recent Advances in Nutrition on Food and Feed Control Problems."

The AOAC banquet will be held Tuesday evening, September 30, with an address by C. W. Dunn, New York City food attorney, on "Some Observations on the Food and Drug Law."

Feed Control Officials

REPORTS of Committees comprise the bulk of the two-day (October 1 & 2) meeting of the Feed Control Officials. Dr. L. E. Bopst, secretary-treasurer of the Association will present his annual report on October 1, followed by a business session presided over by president F. W. Quackenbush, Purdue University, Lafayette, Ind.

Dr. Quackenbush will call on committee chairmen and investigators to give their reports, with a total of thirty-four scheduled to appear with various kinds of information gathered during the past year.

According to Dr. Bopst, Tuesday's program was not complete at

press time, but some of the speakers had confirmed invitations to appear. Dr. C. R. Grau, Division of Poultry Husbandry, University of California, Berkeley, will speak on "Some Aspects of Protein Nutrition;" and C. W. Sievert, consultant to the feed industry, Chicago, Ill., will present a paper, "The Feed Consultant and the Control Official."

Others tentatively named on the advance program included a representative of the National Fisheries Institute, Washington, D. C. and Ray Bowden, Grain & Feed Dealers National Association, Washington, D. C.

Tuesday afternoon's session will be devoted to reports of the executive, credentials, auditing and resolutions committees, elections of officers; and a session for feed control officials only, wherein matters pertaining to new definitions and regulations will be discussed.

Fertilizer Group

THE annual meeting of the Association of American Fertilizer Control Officials is scheduled to be held at the Shoreham Hotel, Washington, D. C., October 3, according to Dr. Bruce D. Cloaninger, Clemson, S. C., secretary-treasurer of the Association. The meeting will be held in connection with Conventions of the Association of Economic Poison Control Officials; the American Association of Feed Control Officials; and the Association of Official Agricultural Chemists, all of which are also meeting at the Shoreham during the early days of October.

Dr. J. F. Fudge, College Station, Texas, president of the A.A.F.C.O., will address the Association during the morning program, followed by Dr. Russell Coleman, president, the National Fertilizer Association, Washington, D. C.

Paul T. Truitt, president, American Plant Food Council, Washington, D. C., will speak on "Prospective Promotions for Plant Food" and Dr. Edwin C. Kapusta, chemical engineer, National Fertilizer Association, Washington, D. C., will discuss "Some Manufacturing Problems and New Developments in Fertilizer Technology."

"Polyelectrolyte Soil Amendments" will be the subject of a talk by Alien B. Lemmon, chief, Bureau of Chemistry, Sacramento, California, who is to follow Dr. Kapusta on the program.

To complete the morning's program, Dr. H. J. Fisher, New Haven, Conn., will present the report of the States Relations Committee.

Members of the executive committee will gather for a luncheon session at noon and in the afternoon. Rodney C. Berry and M. B. Rowe, both of the State Department of Agriculture, Richmond, Va., will discuss the distribution of bulk fertilizers. They will be followed by Stacy B. Randle, New Brunswick, N. J., who will report on the model state fertilizer bill. G. W. Michael, Ottawa, Ontario, Canada, will present the report of the executive committee.

The following will also present reports: M. H. Snyder, Charleston, Va.; M. P. Etheridge, State College, Miss.; J. W. Kuzmeski, Amherst, Mass.; Dr. Fudge; R. W. Ludwick, State College, N. M.; W. B. Griem, Madison, Wis.; J. B. Smith, Kingston, R. I.; Rodney C. Berry, Richmond, Va.; Gordon Hart, Tallahassee, Fla.; E. W. Constable, Raleigh, N. C.; John L. Monaghan, Topeka, Kans.; Bruce Poundstone, Lexington, Ky.; F. W. Quackenbush, Lafayette, Ind.; G. H. Laramie, Concord, N. H.; Allen B. Lemmon; E. A. Epps, Jr., Baton Rouge, La.; and M. B. Rowe, Richmond, Va.

Reports of the auditing, resolutions and nominating committees, plus election of officers, will conclude the formal portion of the program.

A presentation in the form of six plaques is planned to be made to the past presidents of the Association, according to Dr. Cloaninger.

AEPCO Ends Meeting

COMPLETING the week's series, the A.E.P.C.O. plans an all-day session at the Shoreham. According to Dr. A. B. Heagy, College Park, Md., secretary-treasurer of the group, a round table discussion is to cover details of regulatory activity, to benefit members unable to attend the meeting of the executive committee earlier. Members of the panel had not been selected at press time.

Dr. E. W. Constable, State Chemist, Raleigh, N. C., president of the A.E.P.C.O., will address the assembly on Saturday morning. Others slated to appear on the program include Dr. H. L. Haller, assistant chief, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, on "Newer Materials as Pesticides."

M. F. Crass, Jr., secretary of the Manufacturing Chemists' Association, will speak on "The Labeling of Pesticides" and Dr. A. J. Lehman, chief, Division of Pharmacology, Food and Drug Administration, Washington, D. C., will discuss "Toxicity of Newer Pesticide Materials."

Four groups of control officials to consider problems of law enforcement in every state. New pesticides, new uses for fertilizers and labeling of soil conditioners all pose important problems.

NFA

Plans November Meeting at Roney Plaza Hotel, Miami Beach Big Attendance is Expected

THE National Fertilizer Association will hold its annual fall convention at the Roney Plaza Hotel, Miami Beach, Fla., November 19 through 21, the NFA has announced.

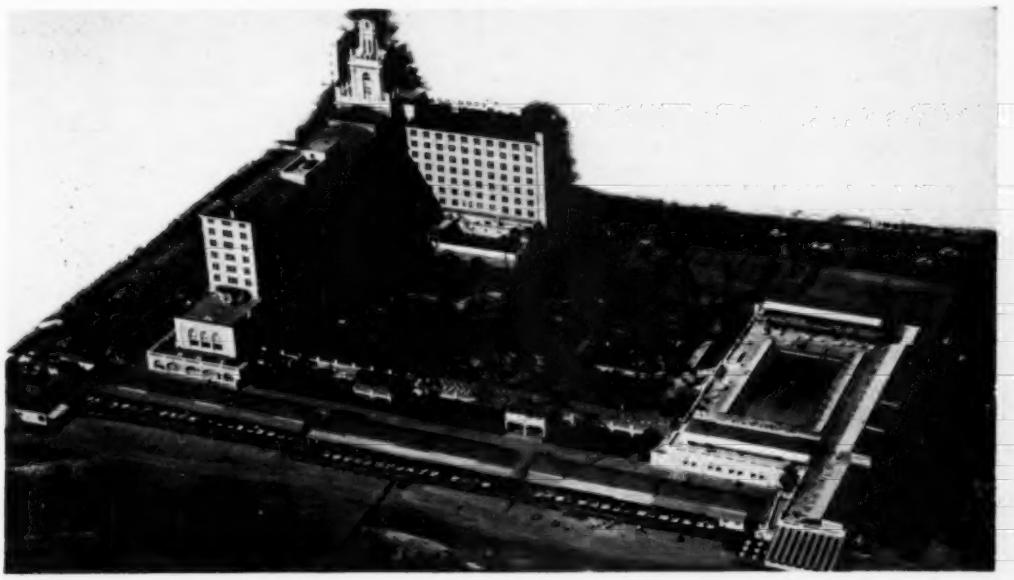
The board of directors will meet on November 19 and the regular convention program will begin on the morning of November 20. A banquet will be held on the evening of November 21 at the conclusion of the formal proceedings.

Dr. Russell Coleman, NFA president, said that representatives from Federal and State agricultural agencies, and a representative from the American Bankers Association will address the convention. In addition, an outstanding national political leader will discuss matters relating to the fertilizer industry and the national economy.

Since registration is heavy, it is probable that the Roney Plaza Hotel will not be able to acommodate all those who desire to attend the meeting, the Association has indicated. In order to provide sufficient accommodations for those attending the convention, arrangements have been made with the close by Surf Side and Traymore Hotels to provide for the overflow. Reservations at all hotels will be handled by the Roney Plaza.

Since the business meetings will be morning affairs, ample time is provided for convention visitors, if they wish, to take advantage of golfing and fishing facilities available in this resort area. Also, those who wish to extend their travel, may make arrangements to visit Nassau in the Bahama Islands or Havana, Cuba, either before or after the convention.

Below: Air view of Roney Plaza Hotel, scene of NFA's 1952 Fall Meeting



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Increased Farm Production to Fill "Fifth Plate" Depends on Use of

CHEMICALS

THE title of this paper, "Food for the Fifth Plate", may require a certain amount of explaining so that everyone will know what it means.

To me, the fifth plate is a symbol — a symbol that puts a lot of hard-to-comprehend farm facts about our future on an understandable basis. Through this "fifth plate" idea, we hope the man in the street and the housewife will come to understand certain problems of the farmer, who is expected to keep this nation well-clothed and well fed.

Essentially, the fifth plate story is this: If we keep on populating our nation at the rate we are going now— more than two million increase a year — by 1975 we're going to have at least 25 percent more people to feed and clothe. There will be five people for every four that are here today, making necessary a fifth plate on the table where four places are set now. And from our farms will have to come the extra food to heap that fifth plate full, three times a day.

Practically speaking, the extra food must come from the same land now in use. Those acres will have to be made more productive. A better job will have to be done in preventing loss and waste of products. Farmers will have to spend more if they are to produce more and will therefore be subject to greater financial risks unless the farm programs and good farming reduce the risks.

It will take a lot of doing to make sure of 15 billion more eggs a year, an extra 20 million hogs, more than 10 billion extra quarts of milk a year — about 30 million extra quarts a day — just to keep folks eating as well as we are now eating. Of course, we're not thinking just of 1975, but of every day between now and then — and of the years beyond.

I believe that the manufacturers, distributors, and sellers of agricultural chemicals have at least as much to offer as any other industry serving the farm. The country is going to depend on these to help fill that fifth plate.

Frankly, I don't doubt for a minute that the fifth plate can be filled. We have a handful of good weapons to work with to do the job: research and education; power and machines; conservation, price support, credit, and electrification programs; agricultural chemicals; and, most important, *good farmers!*

One needs only to know that the NAC organization is not quite 20 years old, to understand the influence that the industry has had on our record agricultural output the last 10 or 12 years. When the National Agricultural Chemicals Association was organized in 1933, there were only 12 chemical manufacturers represented. Now, there are more than 10 times that many.

In 1933, there were about 100 million pounds of agricultural chemicals — not including fertilizers — manufactured, while today the figure is more like one billion pounds. That is spectacular progress.

Progress Widespread

IT is significant that similar spectacular progress has been made in total agricultural production in the United States. Since 1933, when the pesticide industry began to take active interest in the chemical needs of the farmers, farm production has increased by 50 percent. This was done primarily, by increasing the crop production from each acre 48 percent during those intervening years. Consider too, that since 1933 more than 7 million people have left the farm.

by

W. A. Minor

Assistant to the Secretary of Agriculture,
U. S. Department of Agriculture,
Washington 25, D. C.

Talk by W. A. Minor, Assistant to the Secretary of Agriculture, at the Nineteenth Annual Meeting of the National Agricultural Chemicals Association, Spring Lake, New Jersey, September 3, 1952.

Production per man hour has gone up 75 percent, so that today only about 16 percent of our entire population is producing the bulk of the food we eat and fiber for the clothes we wear.

Yet we have by no means fulfilled our farm production potential. We have increased production 50 percent in less than 20 years with the help of a chemical industry that, agriculturally speaking, has barely gotten its feet wet. From here on, production increases will probably come harder. We will need to make greater use of all those factors that will increase production — and the chemicals are important among those factors.

Fundamentally, it seems to me that there are two jobs to be done in the next 20 or so years, if we are to fill that fifth plate.

We must increase our output of food, feed, and fiber from each acre and each man. And, we must better utilize our output by protecting that which we raise.

We've all been giving a lot of attention to that first need; not so much to the second. We've concentrated pretty heavily in the past 10 years on higher yielding crop varieties, grown and harvested with power and machinery that replaced the hired hands. Advances in those fields are by no means complete, but they are much further along — at least in the farmers' understanding of them—than are the protective measures, that save what we raise.

The importance of agricultual chemicals in filling these needs is not in doubt. Agricultural chemicals can do a lot of good in increasing per acre production with less labor; they can do the same in protecting this production.

Chemicals Top List

ROUGHLY, fertilizers and the new soil conditioners should be put on the list of agricultural chemicals that have, and can help increase per acre crop production. Chemical fertilizers have been pretty well sold to the American farmer — both in tons and as an idea that they can increase his crop yields. The fact that farmers have doubled their use of fertilizer in the last seven years bears that out. Today, 60 percent of America's farmers are using 21 million tons of fertilizer. The farmer may look on these fertilizers he uses strictly in terms of better yields, but they are also allowing him to use his machines, fuel, and power more efficiently, and they are conserving and improving his land.

Yet, we still have 40 percent of our farmers *not* using fertilizers. And think, too, of the gains that will be made in crop production as the farmers now using fertilizers learn to use them better!

The knowledge of how and when to use fertilizers and in what amounts to get a top return in crop yields has yet to be exploited. The Department of Agriculture and the Land Grant Colleges are developing a fertilizer utilization program that should aid in getting fertilizer used so as to increase production of needed crops, lower costs and increase farm income.

I can't be so positive about soil conditioners because we haven't seen them in use for 20 or more years as we have fertilizers. But the indications are that they can help us make use of much of our hard-to-farm land. They can reduce the amount of runoff from our clay soils; make planting easier, encourage seed germination, and allow the roots of important crops to get a better foot-hold in the soil.

Protecting what we produce is a wide-open field for agricultural chemicals. I know that many of you are kept busy manufacturing and selling a few specific chemicals — perhaps only a single insecticide, so it's worth while, I believe, to take a brief look at the pesticide industry as a whole — to check and see how widely these chemicals are used on the farm today.

We have our herbicides that prevent weeds from stealing valuable plant-building moisture and food away from the crops. There are the fungicides, that can prevent losses to disease; defoliants that allow greater harvest of some crops; hormones that give us bigger fruits, and possibly meatier animals. We have rodenticides, that keep the rats and mice from stealing and destroying our stored foods; fumigants that protect our stored foods, protect foods in transport, and control some soil-infesting pests. And, of course, we have insecticides, which often make the difference between a crop and no crop.

Herbicides that replace the cultivator and the hoe have been a Godsend to the corn and small grain farmers who last year treated more than 30 million acres. The experimental use of herbicides in the potentially great corn country of the South has tripled corn yields. In cotton, their use reduced the cost of weed control 31 percent below the cost of mechanical weeding. The use of herbicides to remove sagebrush from Southwestern ranges has increased beef production from these acres as much as 50 percent.

The hormone sprays delay the blossoming of fruit trees and thus avoid the damage of a cold snap. Trees can be prevented from shedding their fruit at too early a date. These chemicals can be used to thin a fruit tree so that the remaining fruits are larger and of better quality.

Defoliants are being used widely in the South to hasten the maturity of the cotton and to make mechanical harvesting an easier job. Defoliants reduce losses to diseases and insects as well. On potatoes, defoliants reduce the damage from late blight disease. They make harvesting easier, and provide a more rugged, bruise-resistant spud.

Rats and mice destroy 4 percent of our grain every year. The Fish and Wildlife Service figures that there is about a rat apiece for each of us in the U. S. — about 150 million of them — taking a $2 billion toll annually. Rodenticides certainly can help us fill our fifth plate.

Plant Disease Control

USE of agricultural chemicals to prevent fungus disease attacks on our crops has been stepped up considerably with the development of the newer organic compounds. Fungicides are serving us well. They prevent the disease, apple scab, that in

(*Turn to Page* 121)

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S. W. Arsenate of Calcium
S. W. Aphamite 15% Parathion)
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S. W. DDT 25% Emul.
S. W. Dormant Spray Oil
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DDT 25% EMUL.

LINDANE 20% EMUL.

CHLORDANE 50% W. P.
LINDANE 25% W. P.

MOSQUITO LARVICIDE FOR SURFACE SPRAYING AND FOGGING

The Listening Post

Fungicides Tested on Fruit Fire Blight

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

FIRE blight caused by the bacterium *Erwinia amylovora* has been one of the principal limiting factors in the production of apples and pears in Colorado, according to a report by W. D. Thomas, Jr., and W. J. Henderson, of the Agricultural Experimental Station and Agricultural Extension Service in Colorado. It has been conservatively estimated that this disease causes an annual loss of about 10 percent of the entire apple and pear crops in the state, or about 157,000 bushels of apples and 19,900 bushels of pears.

Until 1947, only Bordeaux mixture had been used as a spray in Colorado to combat fire blight. Spray tests for the control of powdery mildew in 1946 in western Colorado, however, indicated that trees sprayed with "Dithane D-14" in the cluster bud and calyx stage of blooming had far fewer spurs infected with fire blight than did the unsprayed checks.

Spray tests for the control of fire blight were established in Fremont and Mesa Counties in 1947. The original experiments were designed to investigate the efficacy of carbamate fungicides in controlling this disease on apples and pears.

In 1947 plots were established on pears in Mesa County and on apples in Fremont County. "Dithane D-14" and Zerlate" were used in the former plot and "Dithane D-14" only was used in the latter. Two quarts of "Dithane" were mixed with one pound of zinc sulfate and one-half pound hydrated lime per 100 gallons of water. "Triton B-1956" (one ounce) and 50% DDT (two pounds) were added to all treatments. Check plots were sprayed with 50% DDT only. Applications were timed as indicated in Table 1.

The treatments were applied to three-tree blocks in four randomized replications. An unsprayed buffer row and an unsprayed three-tree buffer block was left between each sprayed row and block to prevent overlapping of spray materials. Observations were made by counting the total number of infected spurs on the center tree of each non-sprayed check and sprayed block.

The results shown in Table 1 indicate that the reduction of infection on pears by "Dithane" and "Zerlate" was highly significant, although there were no significant diferences between the treatments or times of application. Effective control on apples was obtained when spray was applied at the full bloom stage, but when sprayed at the 10-percent bloom and again at full bloom stages results were highly significant.

Results were based on the count of infected fruit spurs, which were classified by an arbitrary index of infection from 1 to 6: (1) no infection; (2) 1 percent to 10 percent infection; (3) 11 percent to 30 percent; (4) 31 percent to 50 percent; (5) 51 percent to 80 percent; and (6) 81 to 100 percent.

Because growers maintain that a 50 percent control of a heavy infection of fire blight in an orchard allows sufficient new growth and set of healthy fruit for a satisfactory crop, and since more than 50 percent control was obtained in these tests, similar tests were conducted in 1948 and 1949.

TABLE 1

Results of spray tests for the control of fire blight on apples and pears in 1948 in Colorado

Treatment	Time of application	Average No. infected spurs		Percent reduction on No. infected spurs	
		Pears	*Apples*	*Pears*	*Apples*
Dithane D-14	10% bloom	10.0	4.8	75.0	60.4
	Full bloom	16.7	3.3	62.5	72.9
	10% bloom and full bloom	13.2	3.8	67.5	68.7
	10% bloom, full bloom, and 90% petal fall	8.5	6.0	79.2	50.5
Zerlate	10% bloom	15.5	-	61.3	-
	Full bloom	13.0	-	68.0	-
	10% bloom and full bloom	13.5	-	66.8	-
	10% bloom, full bloom, and 90% petal fall	12.5	-	69.3	-
Check	Unsprayed	40.2	12.0	-	-
	LSD 5%	19.5	5.5	-	-
	LSD 1%	26.0	7.6	-	-

In 1948, zinc sulfate was used at the rate of two pounds per 100 gallons of water, in order to determine whether or not it was instrumental in securing control of fire blight. "Dithane Z-78" and "Puratized Agricultural Spray" were also used as treatments, applied at the rates and stages indicated in Table 2. "Triton B-1956" (1 oz. per 100 gal.) was added to all spray materials. No DDT was used in 1948. No treatments were used on the checks. The methods and locations in 1948 were similar to those used in 1947.

As shown in Table 2, "Dithane Z-78" gave a significant reduction of fire blight on pears when applied at the full-bloom stage. There was also a highly significant reduction in the percentage of infected spurs on both apples and pears when "Dithane Z-78" was applied at both the 10 percent bloom and full-bloom stages. However, an additional application made in the 90 percent petal fall stage failed to give a significantly better control than an application in the 10 percent bloom followed by an application in the full bloom. This was undoubtedly due to the short-blooming period under Colorado conditions. In states where the blooming period covers a longer time, an application in the 10 percent bloom followed by applications in the full-bloom and 90 percent petal fall would be needed. Neither "Puratized Agricultural Spray" nor zinc sulfate gave satisfactory control of fire blight in these tests.

TABLE 2

Results of spray tests for the control of fire blight on apples and pears in 1947 in Colorado

Treatment	Rate of application when applied and stage of bloom			Percent infected spurs		Percent control over check	
	Per	100 *gal.*	*Bloom Stage*	*Pears*	*Apples*	*Pears*	*Apples*
Dithane Z-78	2	lbs.	Full	5.4	8.2	66.7	37.0
	do.		10% + full	0.8	1.1	95.1	91.0
Puratized Agricultural	1	pt.	Full	17.5	-	-1.3	-
spray	do.		10% + full	25.0	-	-64.8	-
Zinc sulfate	2	lbs.	Full	3 22.5	11.3	-72.0	15.0
	do.		10% + full	12.5	7.8	-22..8	22.6
Check	-		-	16.2	13.3	-	-
			LSD 5%	6.4	6.0	-	-
			LSD 1%	8.7	8.4	-	-

1949 Tests on Apples

IN 1949, the tests were conducted on apples only in Montrose County. An entire orchard was included in this test and consisted of 118 Jonathan trees and 114 Delicious trees. The varieties alternated in the rows. Two check blocks of nine trees each were left unsprayed in the orchard. All other trees were sprayed with "Dithane Z-78" (2 lbs. per 100 gals. water) to which "Triton B-1956" (½ oz. per 100 gals.) was added. Applications were made at the 10 percent bloom stage with subsequent applications in the full-bloom stage.

For the Jonathan variety results show that 88.1 percent of the sprayed trees and 33.3 percent of the unsprayed trees had from none to a trace of infected spurs; 8.5 percent of the sprayed trees and 39.0 percent of the unsprayed trees had from 1 to 10 percent infection; 1.7 percent of the sprayed trees and 22.3 percent of the unsprayed trees had from 11 to 30 percent infection. and 1.7 percent of the sprayed trees and 5.6 percent of the checks had from 31 to 60 percent infection.

Of the Delicious variety, 97.7 percent of the sprayed trees and none of the unsprayed trees had from zero to a trace of infected spurs; 8.5 percent of the sprayed trees and 39.0 percent of the checks had from 1 to 10 percent infection. None of the sprayed trees had any greater infection. Of the check trees, however, 55.5 percent had from 11 to 30 percent infection.

In 1950, the same procedure was used as in 1949 on Jonathan trees in the same orchard, with the exception that three entire rows were left at random as unsprayed checks. Approximately 50 percent of the trees in the unsprayed check had a medium amount of twig infection and only a trace of fire blight occurred in the sprayed trees.

In these spray tests, conducted on apples and pears at several locations in Colorado in 1947, 1948, 1949, and 1950 for the control of fire blight, it was found that application of "Dithane Z-78" (2 lbs. per 100 gals. water) in the 10 percent bloom and a subsequent application in the full-bloom stage reduced the incidence of current season blossom and twig infection approximately 75 percent.

This spray method, together with sanitary pruning and treatment of hold-over cankers, has become a standard recommendation for fire-blight control in Colorado.

In areas where the blossoming period is considerably longer than that where these investigations were conducted, an additional application should be made about the 90 percent petal-fall stage of blooming. ★★

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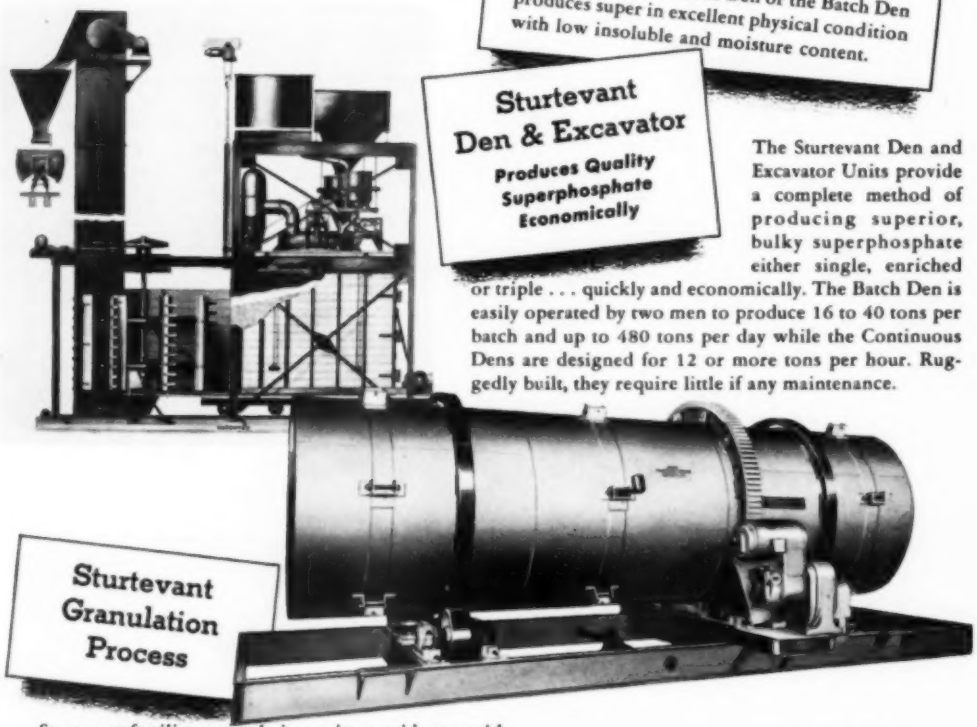

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Insect Pest Reports From Many U. S. Points

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is connected with the department of Insect Pest Survey and Information, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

HOT dry weather of late July and early August influenced European core borer activity considerably. In Kansas, a combination of drought conditions and an abundance of lady beetles aided materially in reducing the second-generation population of the borer. Second-generation borers were expected to be light in southern Illinois and Tennessee, primarily because of drought conditions. Indiana and Ohio also indicate that second-brood borers may be light. Not all states have reported a downward trend, however. Second-brood European corn borer moths were emerging in early August in Wisconsin and indications were that the second-brood population might build up to the level of the 1949 infestation. The same is true for Minnesota where the peak of the second-brood emergence was expected during the last two weeks of August. In Iowa, borer development continued a week ahead of previous years. First-brood infestation was fairly high across northern Iowa with second-brood oviposition spread generally and not concentrated in late planted fields. Peak oviposition in Iowa was anticipated to be about August 8. Maryland and Massachusetts in early August expected increased activity from the borer. Montana, where the borer was first reported in 1951, recorded light infestations in irrigated corn in Dawson and Richard Counties, late in July.

Reports received during early August from several states indicate that grasshoppers were causing damage or their populations were building up. In the Nashville, Tennessee, area, grasshoppers were abundant and were damaging practically all foliage. The drought condition was thought to be instrumental in the overall feeding of the hoppers. Other states reporting grasshoppers included Georgia where peaches and cotton in Spalding County were damaged as were fescue and orchard grass in Butts County. Control was needed in some Bahia grass plantings in northern Florida. In some northwestern North Carolina counties corn, tobacco, alfalfa, and grasses were being damaged as were red clover and corn in Queen Anne and Kent Counties, Maryland. Grasshopper populations were building up in some Ohio clover and alfalfa fields to a point where control was necessary. Spotted areas of Illinois, mostly in the southern section, had populations high enough to damage clover, soybeans, and corn. Populations in the southern areas of Wisconsin continued to build up. Wide-spread damage to oats occurred in one section of Burnett County which is in the northwestern part of the State. In Cache County, Utah, alfalfa, wheat and range were being damaged. Infestations were high in the cultivated areas of the south central part of Idaho and range species were moving into fields on the edge of irrigated tracts.

During early August, second-generation chinch bugs caused considerable damage to late thin corn and summer grasses in Illinois. The highest overwintering population in 20 years is expected in that State unless adverse weather conditions are encountered.

The heaviest lygus bug populations on alfalfa since 1940-1943 were reported from Utah in early August. Reinfestation after bud stage treatment was particularly heavy. These insects were also building up in population in southern Idaho alfalfa and clover seed fields to a point where control measures were being applied. Damage to seed alfalfa was reported from Mesa County, Colorado and heavy populations were on alfalfa in Park County, Wyoming and legumes in Tennessee.

Cotton Insects

SURVEYS being conducted in connection with the pink bollworm continue to show an alarming build up. In the July issue of *Agricultural Chemicals*, it was reported that bloom inspections in the Coastal Bend area of Texas showed a much heavier pink bollworm infestation than in 1951. Gin trash inspection under way in early August of this year in the Rio Grande Valley of Texas presented some interesting figures. The average number of pink bollworms found in gin trash per bale of cotton ginned was as follows: Cameron County, 3,625 pink bollworms in 1952 compared to 23 in 1951; Hidalgo County, 861 to 22; Starr County 1,811 to 79; and Willacy County, 2,942 to 2. During early August, first seasonal infestations were found in three additional west Texas counties: Coke, Glasscock, and Howard. This makes a total of 10 west Texas counties found infested this season by the bloom inspection method as compared with one county of the same group found infested last season using the same inspection method.

In early August, the boll weevil infestation increased in many fields of central, northcentral and northeast Texas to a point where heavy damage resulted. Weevils were migrating in Oklahoma and heavy infestations were expected in fields of succulent cotton. In southwest Oklahoma, an increase was noted during the first week of the month. Weevils were on the increase in Arkansas and sharp increases were experienced in fields that had had infestations throughout the season. Despite the dry weather both North

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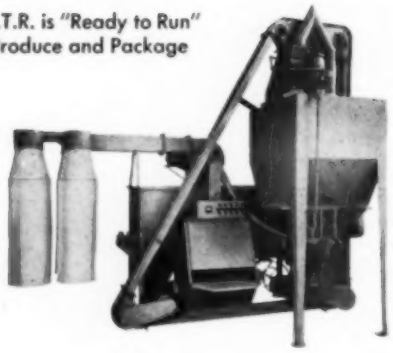

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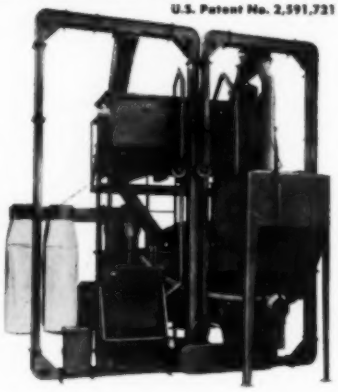

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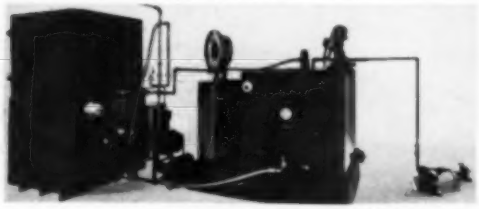

Uni-Blender Liquid Formulating Plants provide for liquefying and injection of specific technical grade toxicants required for the formulation of numerous concentrates and liquid sprays.

Write for descriptive bulletins

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and South Carolina reported an increase of boll weevils in some areas. In the Baton Rouge area of Louisiana there was a slight increase, but in other areas of the State the trend was slightly downward.

Bollworms were causing damage in some states even though in scattered areas. These insects were on the increase in several North Carolina Counties but damage was not heavy at the time the report was made. The same was true for the Upper Coastal Plains, Sandhills, and Piedmont Counties of South Carolina. In some areas of Georgia, damage was rather high. Injurious infestations of bollworm continued in fields of succulent cotton in Texas but the trend was downward in the central and northern areas. In the Messilla Valley of New Mexico bollworms, eggs and larvae increased sharply during early August. During this period bollworms were the outstanding cotton insects in Graham and Cochise Counties, Arizona.

Spider mites were on the increase in South Carolina, Georgia, Tennessee, Misisippi, Louisiana, Texas, and California. Control measures were being applied in Louisiana and Texas and damage was also reported from South Carolina and Mississippi.

Vegetable Insects

SPIDER mites were becoming increasingly abundant on potatoes, sugar beet, peppermint and alfalfa in the Prosser vicinity of Washington during the first part of August. Considerable damage in this area is expected before the end of summer. In Orange and Ventura Counties, California, the heavy populations of the two-spotted spider mite were building up along the edge of many lima bean fields. Control measures for mites were necessary in some bean fields of south central Idaho. In eastern Virginia, beans, tomatoes, and strawberries were being injured while on the Eastern Shore of that State, mites were damaging soy-beans.

Leafhoppers, in early August, were damaging vegetables in many sections of the United States. In Massachusetts they were abundant on beans and lettuce while in Niagara County, New York they were destructive on practically all crops. In Wayne County, New York, leafhoppers were present in "cloud" numbers on lettuce growing on muck soil. Other New York counties reporting injury to various vegetables were Jefferson, Erie, Cayuga and Saratoga. Damage was also reported from Milton and Georgetown areas of Delaware. In the Chillicothe and Columbus areas of Ohio beans were damaged. Leafhoppers were unusually abundant throughout Wisconsin on alfalfa, beans, potatoes, cucumbers and other vegetable crops.

In the eastern, middle and old tobacco belts of North Carolina, horn worms were the heaviest in recent years. Damage to tomatoes from hornworms was reported from South Carolina, California, and Utah.★★

•

"Endrin", "Isodrin" Chosen

The Interdepartmental Committee on Pest Control has recently approved "endrin" and "isodrin" as coined names for insecticides. The names have been cleared by a Patent Office search which makes them available as common names for designating the respective compounds.

Endrin is the insecticidal chemical 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-endo-endo-dimethanonaphthalene. The formula is identical to dieldrin, except that dieldrin is the endo-exo isomer.

The material is insoluble in water but is soluble in the usual organic solvents. The solubility of endrin in aromatic hydrocarbon solvents such as benzene and xylene is greater than in paraffinic solvents such as hexane or kerosene.

It is stable to alkalis and unaffected by acidic conditions normally encountered in agriculture. It is compatible with the commonly-used insecticides, fungicides and herbicides, the Committee states.

As to phytotoxicity, endrin seems to be tolerated by most plants when used at concentrations necessary for insect control.

Insect pests against which endrin has shown promise, include the boll weevil, the bollworm, tobacco budworm, the variegated cutworm, the fall armyworm and the tarnished plant bug. The material has also "looked promising" against tobacco hornworm, sugar beet webworm, corn earworm, Mexican bean beetle, European corn borer and various aphids.

Tests for toxicity have led to the conclusion that due to its high order of insecticidal effectiveness, coupled with its moderate residual characteristics, the mammalian toxicity of endrin is not expected to preclude the use of effective quantities except on food and forage crops nearing harvest.

Isodrin is the coined name for the insecticidal chemical 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo-endo-dimethanonaphthalene. The formula is identical to that of aldrin, except that the latter is the endo-exo isomer. Its properties of solubility and compatibility are like those of endrin.

Isodrin seems to be tolerated by most plants when used at concentrations necessary for insect control although corn buds have shown signs of "burn". The chemical shows promise for control of European corn borer, corn earworm, sugar beet webworm, tobacco hornworm, thrips, leafhoppers and various aphids.

As to toxicity, the material must be handled with caution, according to the Committee report, but, like endrin, it is expected to be safe for use, except on food and forage crops nearing harvest time.

Both materials must be handled with extreme care, the Committee report declares. Contaminated clothing must be removed and laundered and products must be washed off skin promptly. Formulating and mixing plants must be well-ventilated to prevent inhalation. "During application, the wearing of respirators should be enforced," the report concludes.

Now-62 new uses make PARATHION more effective than ever!

This year, 62 new claims for parathion have been accepted for labeling purposes by the United States Department of Agriculture. These new claims give parathion a total of more than 200 accepted uses...on more than 50 crops!

Here is new proof that parathion is the *most widely effective of all insecticides:*

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Aphids
Red spider mite
Cranberries:
Lecanium scale crawler
Currants and gooseberries:
Aphids
Red spider mite
Raspberries:
Aphids
Red spider mite

CABBAGE, MUSTARD, TURNIP, KALE, RADISH AND CARROT
Vegetable weevil

CHERRY
Casebearer
Fruit fly
Leaf miner
Pandemis moth
Red spider mite
San Jose scale crawler
Shot-hole borer

CITRUS
Aphids

CORN
Budworm
Corn earworm
Leaf aphid
Fall armyworm
Sap beetle

CUCUMBER, SQUASH AND MELONS
Stink bug
Vine borer

GRAPES
Grape berry moth

LETTUCE
Aphids
Leafhopper

ORNAMENTALS (outdoors)
Bagworm
Cottony-cushion scale
Juniper webworm
Lace bug
Lecanium scale
Thrips

PEACH
Lecanium scale
Red-banded leaf roller
Shot-hole borer

PEAS
Pea weevil

PECAN
Black pecan aphid
Nut casebearer
Red spider mite
Twig girdler
Walnut defoliator
Webworm
Yellow aphid

PINEAPPLE (before planting)
Mealybug

PINEAPPLE (treatment of beds)
Mealybug
Cricket

POTATO
Armyworm

PRUNE AND PLUM
San Jose scale crawler

SOYBEAN
Velvetbean caterpillar

TOBACCO (seedbed)
Flea beetle
Midge larvae
Vegetable weevil

TOBACCO (field)
Flea beetle
Hornworm
Vegetable weevil

TOMATO
Armyworm

Consult local agricultural authorities for suggestions on dosages and application procedures.

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Suppliers' Bulletins

Bag Conveyors Described

Information on "Power Curve" machines for handling bagged materials, has been issued by the Power Curve Conveyor Co., Denver, Colo. Designated as bulletins number 50 and 60, details are given to describe the operation of the devices.

Bulletin #50 contains information on belts for loading trucks and box cars. Completely flexible, the loaders convey bags all the way from packing stations into the truck or car at the rate of 30 bags a minute. The conveyor may be sent to any angle up to 90° while under power and carries bags around corners without interruption, the folder says.

The other bulletin, #60, describes the firm's machines for flattening bags to save room in warehouses and in shipping. The bag is carried between two power-driven conveyors and a pressing and rolling action is applied. The conveying element consists of a series of endless steel spring belts operating over grooved rollers. Spacing between rollers is quickly adjusted by hand, the makers state.

Write for folders #50 and 60 in care of the company, 1235 So. Broadway, Denver, Colo.

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Magnetic Trap Announced

A new four-page, two-color brochure, "Magnetic Pipeline Traps for Sanitary and Standard Applications," has been issued by the Eriez Manufacturing Company. The firm's permanent (non-electric) magnetic pipeline traps are designed to remove tramp iron from liquid flow lines. In doing so they afford protection to processing equipment such as pumps, screens, grinders, fillers, etc.

The traps will not corrode and are unaffected by high temperatures, their makers state. Cast of 316 stainless steel with fused magnetic face plates, they will withstand pressures up to 75 psi. The traps have wide use in the chemical industry including fertilizer manufacture.

Eriez' brochure describes with illustrations and data typical magnetic trap installations. Also included are sections on variables affecting magnetic pipeline trap size, and a material classification of products affecting the capacities, in gallons per minute, of the pipeline traps.

The new brochure (No. B-203) is available from the Eriez Manufacturing Company, Erie, Pa.

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Dust Filtering Unit

Filtering and recovery of dust from two or more exhaust fans, by the same filtering unit and without mixing of products, is claimed for the Day "AC" dust filter equipped with plenum splitters. Dust-laden air from each exhaust fan is filtered separately to allow reclamation of product without contamination. (see cut below)

Licensed under Hersey patents, the filter uses felt tubes as the filtering medium. Filter cleaning is said to be continuous and automatic, by means of slow-traveling reverse air jet rings which dislodge collected dust from the filtering area and discharge it to the air stream leading to the bottom of the unit.

Because of this operation, periodic shut-downs of sections for cleaning are eliminated. The Day "AC" filter also permits use of higher air pressures, at air-to-cloth ratios as high as 20 to 1, to handle greater volumes of air per unit. Further details are available from the makers, Day Company, 810 Third Ave., N. E., Minneapolis, Minn.

•

Stauffer Catalog Revised

Stauffer Chemical Company has just issued a revised 112 page edition of their general catalog covering basic chemicals for industry and agriculture. As in the earlier editions, considerable data are given on all products, and numerous tables on specific gravity, viscosity, specific heat, solubility and other properties give valuable assistance to the user of Stauffer chemicals. Copies available. Write the company, 420 Lexington Ave., New York 17, N. Y.

•

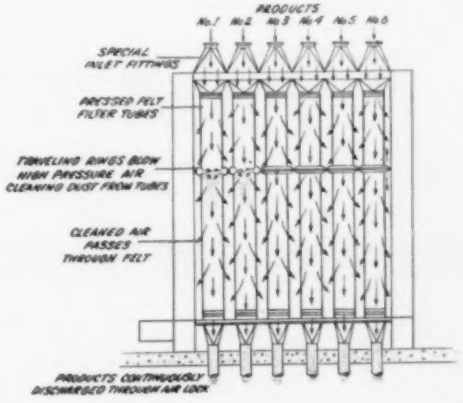
Pest Control Film Out

Completion of a new 16 mm color and sound motion picture entitled "Livestock Pest Control" has been announced by the California Spray-Chemical Corporation.

Local premiere showings of this new educational movie are now being scheduled.

Pests such as the screw worm, the sheep ked, the heel fly and cattle grub are shown in extreme close-ups, and in "action." Practical, "how-to-do-it" scenes show the newest sanitation and control techniques now being

(*Turn to Page* 137)



Technical Briefs

5 Year DDT Residue

Recent research by the U. S. Department of Agriculture indicates that a single application of DDT to the soil will kill some species of insects for at least five years.

Tests conducted in several locations in the northern states show an average DDT carryover in turf of 92 percent after two years, of 43 percent after four years, 36 percent after six years, and 29 percent after seven years.

Entomologists also found that the rate of application had little influence on the percent of toxic residue in the soil. Soil samples, treated at the rate of 25 and 50 pounds of DDT per acre, show the percentage carryover after eight years of testing was about the same in either case.

Tests with different soil types proved that DDT lasts longer in poor soils and a shorter time in soils high in organic matter. Results of experiments with samples of 85 different soil types from seven states, showed that persistence of DDT was about the same in sandy, silt, or clay loams, but much greater in soils heavy in sand.

After analyzing 223,000 Japanese beetle grubs it was found that DDT began losing its killing power only in the fifth year after application. A single DDT treatment at 25 pounds per acre produced a 98 percent grub kill within four weeks after the grubs were put in the soil, during the first four years. It required slightly more than five weeks for the same kill the fifth year.

•

Potatoes Need Boron

Should a boron fertilizer be applied to potatoes? Experiments carried out recently on potatoes in Austria have shown that in certain areas the soil shows a marked boron deficiency and that shoots of potato plants stop growing. The upper leaves are dark green with a tough, shiny surface, while the edges of the pinnules often curve upwards and inwards. The older leaves gradually turn yellow and the shoot tip withers. Symptoms of boron deficiency in the root vary with the variety. A characteristic symptom is that the vascular ring turns partially or completely brown. Rapid discoloration of the cut surface of the potato is another sign of boron deficiency. Soils derived from weathered rocks have been found to be the most-deficient in boron.

—Steineck, O., Die Landwirtschaft, 1951, No. 23/24 (Inst. Pflanzenbau und Pflanzenzuchtung der Hochschule fur Bodenkultur, Vienna.

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Methyl Bromide Fumigation

A method for fumigating bulk cottonseed in freight cars, developed between 1945 and 1951, is described in this paper.

Efforts were made to attain a satisfactory distribution of methyl bromide throughout a freight-car load of cottonseed by various methods of application, such as applying it in the head space above the load, injecting it into the load, applying half the dosage above and injecting half, and dissolving in carbon tetrachloride and spraying on the surface. None were successful. Other innovations, such as partial loads, additional sealing of floors and doorways with gas proof material, providing risers (vertical and horizontal tunnels) through the load to assist in penetration, and following the application with a blast of carbon dioxide, were also unsuccessful.

Attempts were then made to adapt the method of forced circulation used in fumigation of cottonseed in large steel storage tanks. A gas-distribution pattern was obtained that provided a lethal concentration at all sampling points. In the method finally adopted, a portable blower operated outside the freight car pulls air from beneath the load through a specially-designed duct system and returns it to the space above the load. The blower is run during gas volatilization and for 2 to 10 minutes thereafter, then disconnected, the car sealed, and the blower moved to the next car to be fumigated.

This method for treating cottonseed was authorized for use on quarantined cottonseed in February, 1950, in a limited area under supervision. The dosage schedule is 7 pounds per 1,000 cubic feet for 24 hours exposure at 60°F. or above, and 8 pounds at lower temperatures.

The first trial on a commercial basis was at Lubbock, Tex., where approximately 12,000 tons of cottonseed in 306 freight cars were fumigated. All but one of the 162 cars that were checked by gas analyses were found to have the required gas concentration.

In July, 1950, the forced-circulation method was authorized as an alternate method for treating cottonseed for the destruction of pink bollworm larvae.

—Summary of paper, "Methyl Bromide Fumigation of Cottonseed in Freight Cars for the Destruction of Pink Bollworms," by G. L. Phillips, U.S.D.A., Bur. of Entomology & Plant Quarantine, Div. of Stored Product Insect Investigations.

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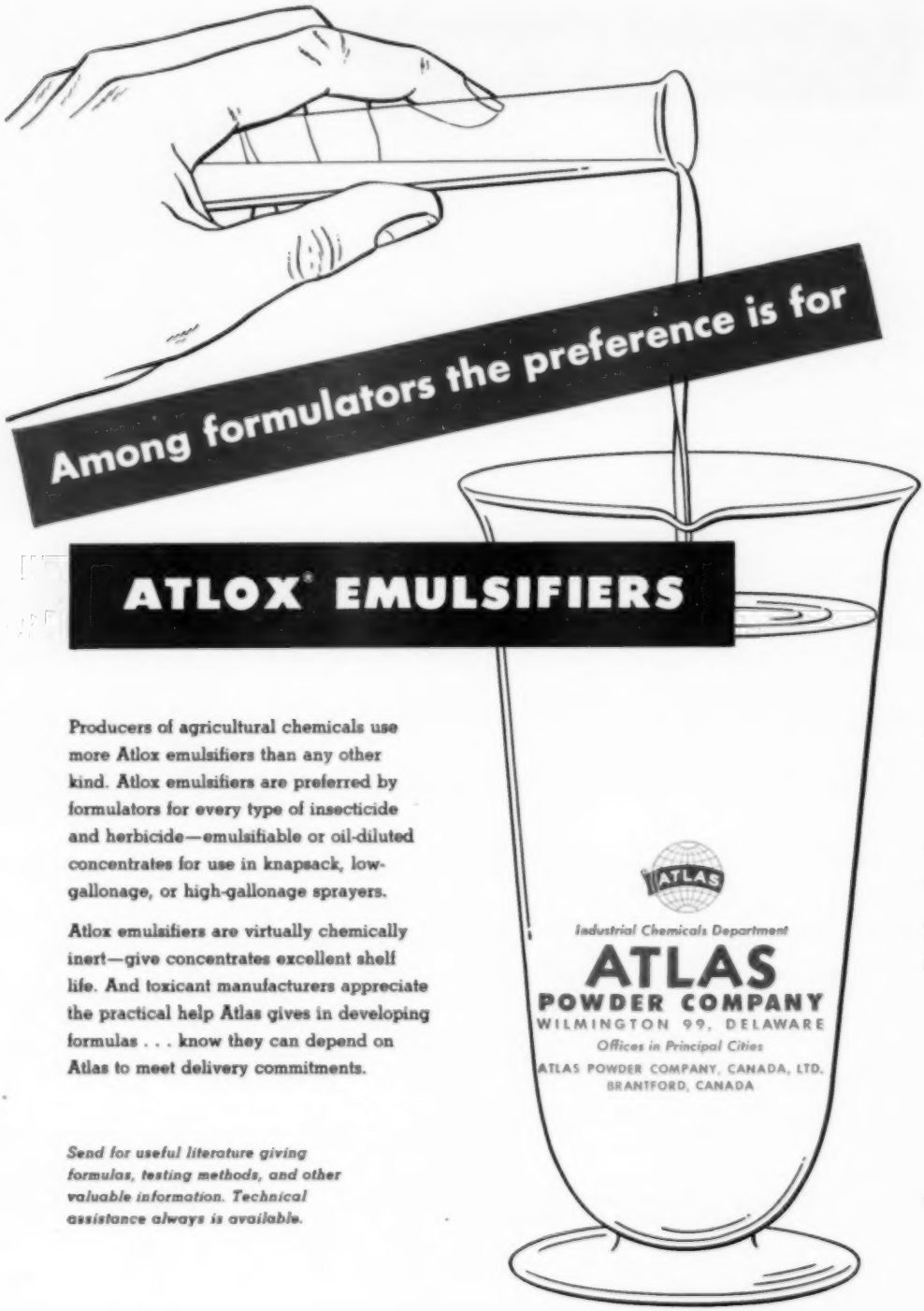
Puts Conditioner on Rows

In an effort to make the use of soil conditioners economically feasible for agriculture as well as for the city gardener, American Cyanamid Company is experimenting on its product, "Aerotil" applied in narrow bands to rows where seedlings emerge.

The idea is, according to an industry spokesman, to place the soil conditioner where it can do an optimum amount of good in preventing a crust which hinders emergence of many crops.

By limiting the application to a strip from 1 to 1½ inches wide, a saving of some 90% may be realized, from the cost of treating an entire acreage. It is thought that by employing such a method, or one akin to it, that the cost might be brought as low as from $15 to $30 per acre. For certain high-priced crops, enabling seedlings to emerge quickly would be well worth the relatively low cost of applying a good soil conditioner, it is said.

American Cyanamid's experiments are not far enough along at



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present to have built up any significant data, the company said.

The appointment of three district sales representatives for Monsanto Chemical Company's merchandising division was announced recently.

Stanley W. Sullivan of Chicago, was assigned the Chicago district, Jack R. Glatthaar of Washington, D. C., was assigned the New England, New York and northern New Jersey district and Robert A. Ehrhardt of St. Louis was assigned the St. Louis district. The newly-formed merchandising division is handling the sales of Monsanto's "Krilium" soil conditioner and other trade-marked products through retail channels.

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Radioactive Testing

A new and accurate method of using atomic energy to detect and measure impurities in various materials, has been developed by Union Carbide & Carbon Corp. scientists at Oak Ridge National Laboratory. The analysis technique is now being offered as a service to industry by arrangement of the Atomic Energy Commission through Carbide and Carbon Chemicals Company.

Dr. C. E. Larson, director of the Laboratory, explains that the analysis technique involves placing the test sample in the Oak Ridge graphite reactor, or "atomic furnace." The sample is thus exposed to neutron bombardment, making traces of impurities in the material artificially radioactive. Then, using instruments and detectors developed at the Laboratory, the exact quantities of impurities present may be measured accurately.

According to the experience gained thus far in perfecting the method, neutron-activation analysis can be of much practical value in determining minute quantities of elements in biological substances; including fertilizers and feedstuffs; fine chemicals; food and food additives; insecticides and disinfectants.

The new method has several advantages not common to other methods of analysis. Tests have indicated its extreme sensitivity for detecting and measuring many chemical trace elements, so slight that they cannot be determined by other chemical and physical testing processes. The method can be more specific than other techniques, since elements to be tested, when irradiated, produce artificially radioactive isotopes possessing their own characteristics as to modes of "decay" and types of radiation. The characteristics are never exactly duplicated in any other radio-isotopes produced.

Contamination, often encountered in conventional analyses, is negligible in neutronactivation analysis, existing only when the irradiated material contains large amounts of elements that strongly absorb neutrons.

The new analysis method permits the examination of larger samples than the amounts usually used in conventional analyses, and it has an unusually high accuracy, according to Dr. Larson.

The Activation Analysis Group of the Laboratory's Analytical Chemistry Divison, which has done much of the work of developing the technique, is conducting the analytical operations of the service, under the supervision of George W. Leddicotte. Its commercial aspects are being handled by the Radioisotope Control Department of the Laboratory's Operations Division, in a manner similar to the raidoisotope plan.

Potato Leafhopper Control

One application of toxaphene spray on second growth alfalfa early

in June protected the crop from the potato leafhopper on the farm of Ivan G. Martin, Ephrata, Pennsylvania. In the picture, the sample on the left was taken from a treated portion of the field, while the stunted clump on the right was taken from the untreated check plot only a few yards away.

Associate County Agent, Harry S. Sloat of Lancaster County, said that the insect, *Empoasca fabae* (Harr.) had done widespread damage to more than 100 unprotected fields in the area. In addition to stunting the growth, feeding of the insects on the undersides of the leaves produced a yellowing, withered effect. Bloom was also reduced considerably.

Lindane Seed Treatment for Beets

THE progressive sugar beet grower has long recognized the value of seed treatment with a fungicide for the control of damping-off organism which, without such control, would completely destroy many stands of seedlings on thousands of acres throughout many of the best producing areas of the United States. During recent years it has become increasingly apparent that many soil inhabiting pests, particularly certain species of wire worms, have become an additional major factor necessitating control in the establishment of satisfactory stands of sugar beets. Excellent results have been obtained by the use of Isotox Seed Treater (75% Lindane) in controlling limonius canus and other species of wireworms.

Three of the four large processors of sugar beets in California supply their growers with treated beet seed. They have standardized the type of treatment and the materials. The fungicide used is "Phygon" (2,3-dichloro - 1,4naphthoquinone) and the insecticide is "Isotox Seed Treater" (75% Lindane). The former is a paste, the later, wettable powder.

(*Turn to page* 127)

Black Leaf RELIABLE, DEPENDABLE PEST CONTROL PRODUCTS

The famous Black Leaf® trademark is the tried and trusted friend of millions of Americans. For more than 40 years it has been the symbol of quality and dependability to farmers, stockmen, fruit and vegetable growers, florists and home gardeners. Here are some old and some new members of the big family of Black Leaf pest control products:

Aldrin: Black Leaf Aldrin Dusts are available in various formulations: 2½% Aldrin, 2½-5-0 (with 5% DDT), 2½-10-0 (with 10% DDT), 2½-5-40 (with 5% DDT and 40% Sulphur), and 2½-10-40 (with 10% DDT and 40% Sulphur). These dusts control boll weevils, bollworms, leaf worms, thrips and similar insects infesting cotton. Black Leaf Aldrin Emulsifiable Concentrate is produced containing 2 pounds of Aldrin per gallon for spraying cotton to control boll weevils, thrips and grasshoppers.

Arsenate of Lead: Black Leaf Arsenate of Lead is a standard, high-quality Lead Arsenate for control of chewing insects in accordance with state recommendations.

Benzene Hexachloride: Black Leaf 3-5-40, containing 3% gamma isomer of Benzene Hexachloride, 5% DDT and 40% Sulphur is widely used on cotton for control of boll weevils, bollworms, thrips, aphids and similar insects. Also available without Sulphur (3-5-0), and with 10% DDT (3-10-40 or 3-10-0).

Calcium Arsenate: Black Leaf Calcium Arsenate is a standard product, especially suited for dusting cotton to control boll weevils and certain other insects, and for use wherever Calcium Arsenate is recommended for dusting or spraying.

Chlordane: Black Leaf 72% Chlordane Emulsifiable Concentrate is a high-quality product for control of ants, roaches, flies, or similar insects . . . and also for control of soil-infesting insects, such as wireworms, Japanese beetle larvae, etc. Other formulations of Chlordane, such as 45% emulsion, 40% dust base and 40% wettable powder, are available.

DDT: Black Leaf 50% DDT Wettable Powder is recommended for control of insects on fruits, vegetables, field crops, etc. Black Leaf 25% DDT Emulsifiable Concentrate is formulated to meet exacting requirements for control of bollworms on cotton, and is generally suitable for spraying crops for which DDT emulsifiable concentrates are recommended. Black Leaf 10% DDT and 5% DDT Dusts are widely used for the control of insects infesting vegetable and field crops and for the control of cotton bollworms. Formulated on a special tobacco material carrier, Black Leaf 10% DDT Dust makes an excellent product for use on tobacco.

DDT/Parathion: Black Leaf 253 is a combination of 25% of DDT and 3% of Parathion, formulated on a special tobacco material carrier. This highly-effective product controls codling moth, leafhoppers, red-banded leafroller, certain scale insects and mites infesting apples, grapes and similar fruits. This combination offers a high degree of efficiency and economy when used in the second cover spray and subsequent applications as recommended by local authorities.

Dieldrin: Black Leaf Dieldrin Emulsifiable Concentrates are formulated especially for use on cotton, to control boll weevils, thrips and similar insects, and provide long-lasting effectiveness.

Nicotine Products (Nicotine Sulphate, Nicotine Alkaloid, and Fixed Nicotine): The famous Black Leaf 40 and Black Leaf 99 are the recommended forms of Nicotine for use in controlling aphids and similar soft-bodied sucking insects infesting fruits, vegetables and field crops, by spraying or dusting – and Black Leaf 155 (Fixed Nicotine) is the recommended form of Nicotine for spraying fruits to control codling moth and similar insects, its use being particularly desirable during the latter part of the season to avoid undesirable residues at harvest. Made by the world's largest manufacturers of Nicotine insecticides.

Parathion: Black Leaf 15% Parathion Wettable Powder (Dustless) is formulated on a special tobacco material carrier to eliminate the hazardous dustiness of this important new insecticide. The Dustless feature is an extra safeguard.

Sulphur Dusts: Black Leaf Dusts, combining Sulphur, Copper and DDT, are recommended for control of leafspot, leafhoppers and certain other insects and diseases attacking peanuts.

TEPP: Black Leaf Vapo-Fume® 40, containing 40% of tetraethyl pyrophosphate, has special utility in the control of mites and certain other insects. Conveniently packed in 1-gallon containers – and in larger containers for remanufacturing purposes. This product is quick-acting and highly effective, leaving no undesirable residues. Precautions should be observed in handling, as with all phosphatic insecticide materials.

Toxaphene: Black Leaf Toxaphene Emulsifiable Concentrates – widely used to control bollworms, boll weevils and similar insects infesting cotton – are formulated to contain 4, 6, or 8 pounds of Toxaphene per gallon. Also used for controlling spittle bugs, grasshoppers and other insects which require extra killing power. Other Black Leaf Toxaphene products are: 40% wettable powder suitable for spraying; 20% dusts (with and without Sulphur); and 40% concentrate for manufacturing dusts.

Weed Killers: Black Leaf 2,4-D Amine Weed Killer and Black Leaf 2,4-D Ester Weed Killer are available in Midwestern and Northwestern grain-producing areas for control of noxious weeds and certain other plants infesting grain crops.

For House and Garden Use: In addition to the products listed above, the Black Leaf family includes pest control products conveniently packaged for house and garden use, such as: Black Leaf 40®, Black Leaf Aerosol Insect Killer, Black Leaf Arsenate of Lead, Black Leaf 1.00% Rotenone Dust, Black Leaf 50% DDT Wettable Powder, Black Leaf Garden Dust, Black Leaf 5% Chlordane Dust, Black Leaf Warfarin Rat and Mouse Killer Concentrate and Black Leaf Warfarin Rat and Mouse Killer Mixed Bait.

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Ohio Pesticide Meeting Brings Information on

CHEMICAL CONTROL of PESTS

THE annual pesticide tour of The Ohio Pesticide Institute, held August 13, 14 at the Ohio Agricultural Experimental Station, Wooster, Ohio, featured a number of experiments dealing with comparisons of various pesticidal materials in different formulations; spraying techniques, including variations in gallonage, nozzle types, pressure variations, etc; and crop lines exhibiting differing degrees of resistance to diseases and insects. More than 100 persons attended the two-day session, which began with an address of welcome by the Dean and Director of the station, L. L. Rummel.

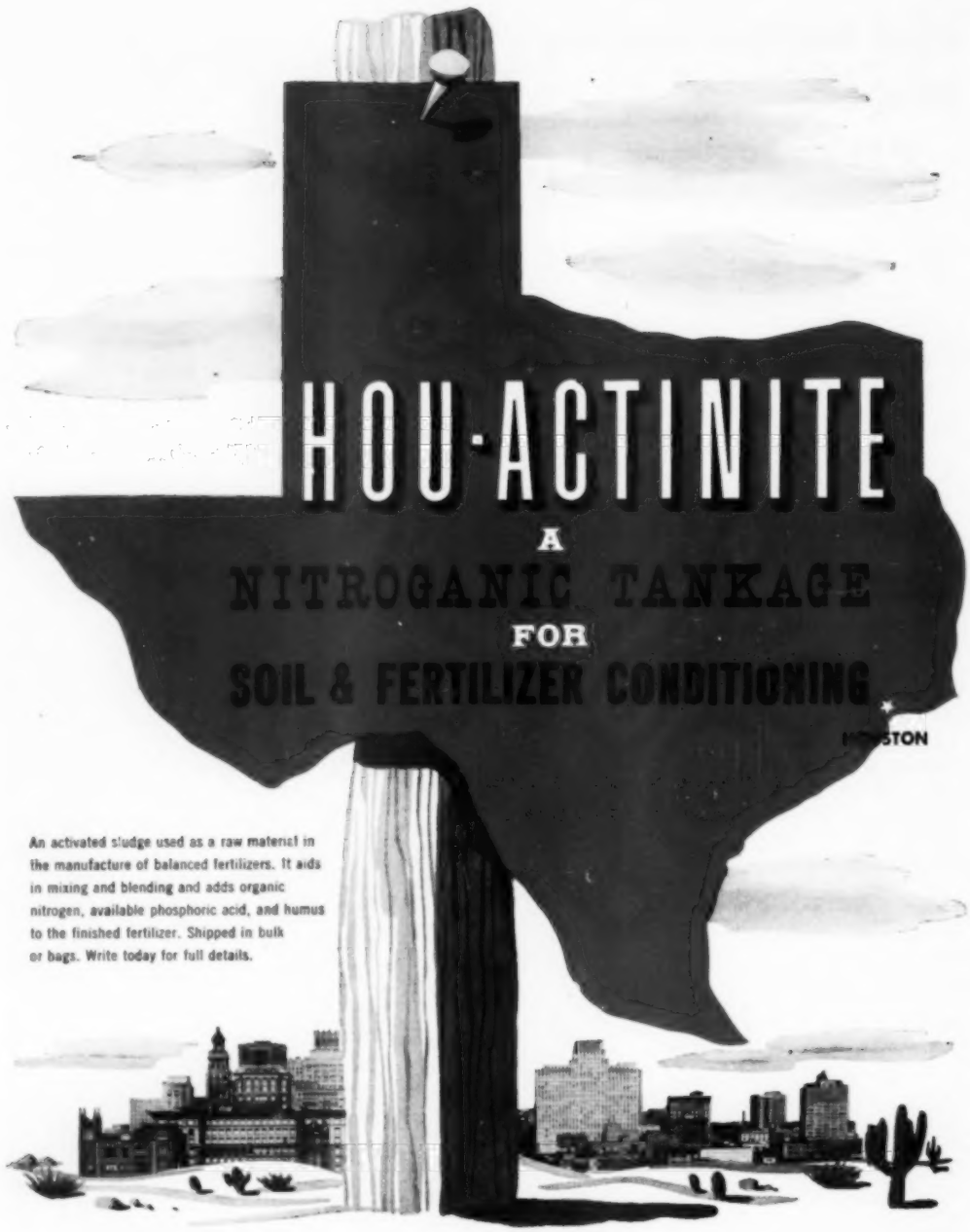
In discussing experiments with thrips control on roses, and insect and mite control on dahlias, R. B. Neiswander, of the experiment station, indicated that insecticides are more effective if applied to foliage instead of the soil, since the pests are then contacted directly in feeding. It was suggested that DDT should be used in all rose formulations, even though it magnifies the mite problem. The latter are effectively controlled with parathion, although this insecticide was not recommended for the home gardener, due to the toxicity hazard. It was reported that DDT seems to encourage the growth of dahlias, and parathion was found particularly good for aphis control.

A series of eleven different fungicide - insecticide formulations were applied to cucumbers for the control of insects and diseases. The same formulations used on cucumbers at Marietta earlier in the season controlled anthracnose of cucumber in the following descending order: (1) "Dithane Z-78" and purified DDT; (2) "Manzate" and DDT-P; (3) "Zerlate" and DDT-P; (4) "Vancide 51ZW" and DDT-P; (5) "Tribasic" and rotenone; (6) "Crag 658" and methoxychlor; (7) "Crag 658" and DDT-P; (8) "Crag" and "Malathon WP." The control plants were found to have 18 per cent of the foliage remaining at the end of the experiment, whereas "Dithane" (that is treatment 1), treated plants had 65% foliage remaining. Methoxychlor applications on cucum-

Top photo. Officers of Ohio group: 1st vice-pres., D. L. Kent, Goodrich Chemical Co., Cleveland; secretary, J. D. Wilson, Ohio Experiment Station; second vice-president, D. Zimmerman, Diamond Fertilizer Co., Sandusky, O.; treasurer, M. G. Farleman, Standard Oil Co. of Ohio; and president, H. E. Bruner, Monsanto Chemical Co.

Center photo: (Kneeling) Dean L. L. Rummel, R. B. Neiswander, C. R. Neiswander, Frank Irons. Standing: H. F. Winter, J. D. Wilson, C. R. Cutright, and H. C. Young.

Lower Photo: Sprayer being demonstrated in Ohio orchard.



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bers did not kill aphis, and it was recommended that parathion be used against this pest.

Results of a series of 16 different soil additives applied to test plots which were then analyzed for disease incidence, are still under anaysis; however, of the compounds tested, "Dithane Z-78" and a complete "Frit" formulation were found to give somewhat better results than the other treatments.

Studies of disease and insect resistance in potatoes indicated that some varieties were resistant to late blight and to insects; other varieties were found resistant to leaf hoppers, flea beetles, and late blight. The Russet Rural variety was found resistant to flea beetles, and this resistance is attributed to the taste of the leaf; still another factor affecting resistance is surface pubescence.

Another study made on potatoes was one dealing with the influence of variations in the spray schedule on maturity date and quality of potatoes. Eight different programs of bordeaux, DDT, and "Dithane D-14" applications, with the crop to be harvested at four different dates, are currently underway in a study of the effect of degree of maturity at digging on resultant chipping and storage quality and on specific gravity. In this experiment, the vines will be killed or eliminated by different methods before digging in a study of the effect of vine killers on vascular staining and keeping quality.

"Systox" applications on potatoes to control leaf hoppers and flea beetles were found inadequate if used for one treatment; however two treatments did give control, although the period of control is still under determination. The major problem in this experiment is the amount of chemical residue in the tubers.

A HIGHLIGHT of the tour was the demonstration of a new experimental sprayer, designed and built by the USDA Engineering Laboratory at Toledo. The unit was mounted on a Massey-Harris Pony Tractor, and featured power take-off at the front. It included quickly adjustable and removable boom assemblies, and booms equipped with either flat spray nozzles or hollow cone type in 4,3,2, and 1 nozzles for spraying a 5½-foot row (1 row of tomatoes or 2 rows of potatoes). Of considerable interest is the by-pass arrangement of the spray solution piping, resulting in a siphoning effect when the power is shut off . . . . the insecticide formulation is by-passed back to the tank, preventing the clogging of nozzles by the spray compound. The unit permits the use of low gallonage applications and provides accurate control of speed and rate.

Another sprayer demonstrated at the experiment station, was the Myers air-blast sprayer designed to spray row crops or fruit trees. This sprayer could be adjusted to spray a 35′ ridge of tomato or potato plants. It has been tested with favorable results for the control of most vegetable diseases. In the orchard, the concentrate was observed to penetrate the tree, wetting all branches. The sprayer uses a pressure of about 400 psi, and eight standard hollow cone nozzles for spraying trees.

A program applying nine different insecticide formulations to nine vegetable crops, to determine effectiveness in controlling various insects; the effect on flavor of the harvested crop, and the amount of residue in the edible part of the plant is currently under study at the Ohio Experiment Station. Table 1 summarizes some of the results obtained. (all insecticides were combined with dry "Parzate" at 2/100).

All of the insecticide formulations, with the exception of dieldrin and methoxychlor, gave good control

(*Turn to Page* 118)

TABLE 1

Insecticide Formulation	lbs./gal.	Flea beetle damage/leaf	Bean beetle damage	Cabbage worm injury
Malathon 25% WP	2-100	20-21	Light	Med.
Malathon 50 3% Em E-20	1-100	20-21	Light	Med.
Malathon 55% Em E-21X	1-100	20-21	Light	Med.
Systox	1½-100	16	Light	Heavy
NPD 85% Em	1-100	19	Heavy	Heavy
Parathion 15% WP	1½-100	21	Light	Light
G-2311 25% soln.	1-100	21	Light	Heavy
Dieldrin 25% WP	2-100	4	Heavy	Light
Methoxychlor 50% WP	2-100	22	Light	Med.
Untreated Check		35	Heavy	Heavy

TABLE 2

Fungicide	Amt./100	% Scab on fruit	% Russet
Magnetic — 70 sulfur	8.6 lbs.	5.5	12
Tag fungicide	½ pt.	0	7.5
Puratized ag. spray	1 pt.	1.0	9.5
Coromerc	½ lb.	1.0	5.5
Organic mercury A	1 pt.	.5	22.5
Organic mercury C	1 lb.	1.0	23.5
Manzate special	2 lb.	9.5	40.0
Check — no fungicide	—	96.0	—

TABLE 3

Treatment	% living aphis at various dates after treatment			
	6/16 Before treatment	6/18	6/27	6/30
Ukako	100	101	93	67
Check	100	107	92	50
SP Systox 4 oz./100	100	0	0	—

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basic insecticide concentrates

DDT	WETTABLE AND DRY POWDERS OIL CONCENTRATES EMULSIFIABLE CONCENTRATES
CHLORDANE	OIL CONCENTRATES WETTABLE AND DRY POWDERS EMULSIFIABLE CONCENTRATES
ROTENONE	DERRIS AND CUBE POWDERED CONCENTRATES
SABADILLA	GROUND SEED DUST CONCENTRATES
TOXAPHENE	WETTABLE POWDERS DUST CONCENTRATES
LINDANE	WETTABLE AND DRY POWDERS OIL CONCENTRATES EMULSIFIABLE CONCENTRATES
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National Shade Tree Conference
Devotes Much of Meeting to Study of

Chemical Control of Tree Pests

CHEMICAL control of insects and plant diseases affecting trees was an important part of the program of the National Shade Tree Conference August 18-22. The 28th meeting of the group was held at the Statler Hotel, Boston, Mass., with one of the largest crowds in the organization's history.

Discussions on the control of birch leaf miner, roadside brush control, chemotherapy, soil conditioners and fungicidal control of diseases were all prominent on the program which also included talks on training arborists, business outlook for the industry and mechanical means of tree surgery.

Dr. W. P. Martin, Department of Agronomy, Ohio State University, Columbus, Ohio, discussed soil conditioners in general and "Krilium" in particular. He said that "Krilium" has been under test at Ohio State since 1950, using different soils, rates of application, varying crops and under other conditions. Results indicate that from 400 to 2,000 pounds per acre (0.02—0.1%) added in powder form to tight and heavy-texture (clay) field soils, with subsequent mixing to a depth of 6 inches by disking, have "without exception" changed the clay into soils of good friable crumb structure. Soil granulation often exceeded 80%, after such an application, he said. Moreover, the soil aggregates are water-stable and the conditioning chemicals themselves are resistant to decomposition. Structural improvement continued into the third year, but not at the original levels.

Dr. Martin emphasized the importance of loosening up the soil and mixing the conditioning chemical in the soil when applying. The soil-aggregating agents themselves cannot loosen up the soil. They bond to the first soil particles they contact and stabilize the condition produced by the mechanical working of the soil. Attempts to improve soil structure with water solutions of conditioning chemicals by sprinkling and without first mixing, have thus far been ineffective, he said.

Good soil tilth has proved beneficial to many plants tested in statistically - controlled experiments, the speaker stated, but where soil structure was not a critical factor in production, no yield inceases were noted. In general, soil aeration improved, favoring growth for plant roots and activity of soil oganisms. Treated soils drain faster in spring rains, and rain water infiltrates rapidly with less runoff and erosion. Cultivation of conditioned soils is also easier and seedlings emerge more quickly because the soil is not crusted, it was pointed out.

For erosion control, the speaker declared, as little as a half pound of "Krilium" dusted on 100 square feet has formed a surface film and has stabilized the soil against raindrop impact and running water.

Mr. Martin emphasized, however, that soil conditioners do not contain plant nutrients. "They influence plant growth only as they improve soil structure and tilth," he declared.

Birch Leaf Miner Control

POINTING out that the birch leaf miner is a pest found in all parts of the country where birch trees grow, Dr. William W. Cantelo, Bartlett Tree Research Laboratories, Stamford, Conn., told the group of various methods used in controlling the pest.

DDT and parathion have proved effective in laboratory tests in preventing oviposition, but DDT was ineffective in the field. Single sprays of summer oil, DDT oil emulsion and nicotine sulfate were found to be ineffective against the egg state, he said.

Chlordane (1.6 lbs.); lindane (0.25 lbs.); aldrin (0.25.); dieldrin (0.25 lbs.) and Toxaphene (1.2 lbs.) each in 100 gallons of water, gave excellent control in both egg and larval stages. Nicotine sulfate was effective if applied in 2 C 3 sprays. Addition of sodium salicylate had little effect on the amount of control, he said.

Lindane was effective against all immature stages except the 4th instar larvae and prepupae. Lindane and toxaphene applied to the soil in the fall, killed a quarter of overwintering larvae. Sprays on the lower

(*Turn to Page 114*)

This is good news in agriculture and in industry. Increased availability of vital plant nutrients in the form of soluble inorganic salts for fertilizer solutions can mean new products and new markets for fertilizer manufacturers.

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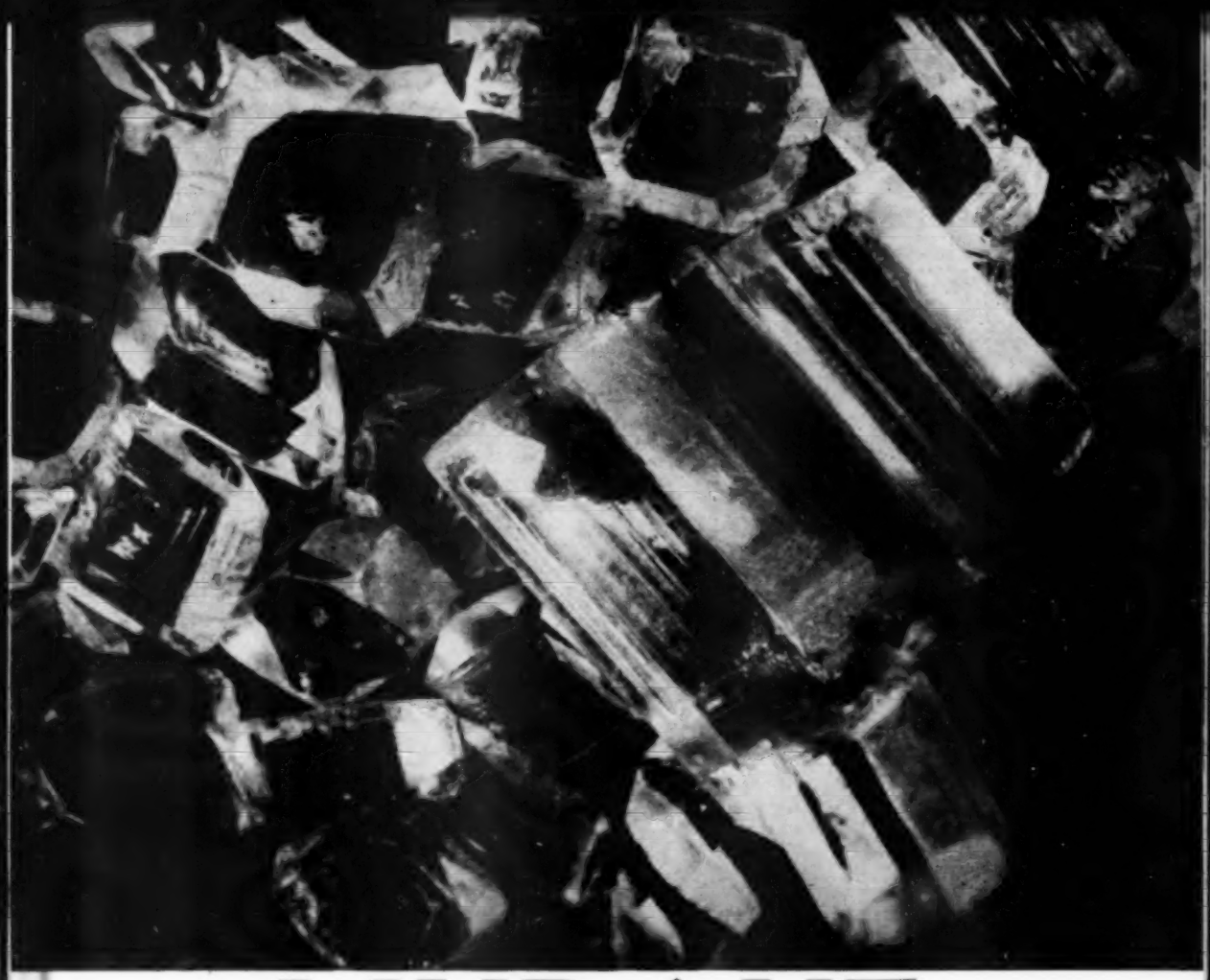


LINDANE

The following is a comlete list of products available from KOLKER CHEMICAL WORKS, DIAMOND ALKALI'S subsidiary, specializing in organic chemicals for agriculture and industry:

DDT	Technical
BHC	Technical Grade (6% and 99% gamma)
LINDANE	99% gamma Isomer
2,4-D	Weed Killers
2,4,5-T	Brush Killers
K-101	Miticide

Order from

KOLKER CHEMICAL WORKS INC.

80 LISTER AVENUE, NEWARK 5, NEW JERSEY

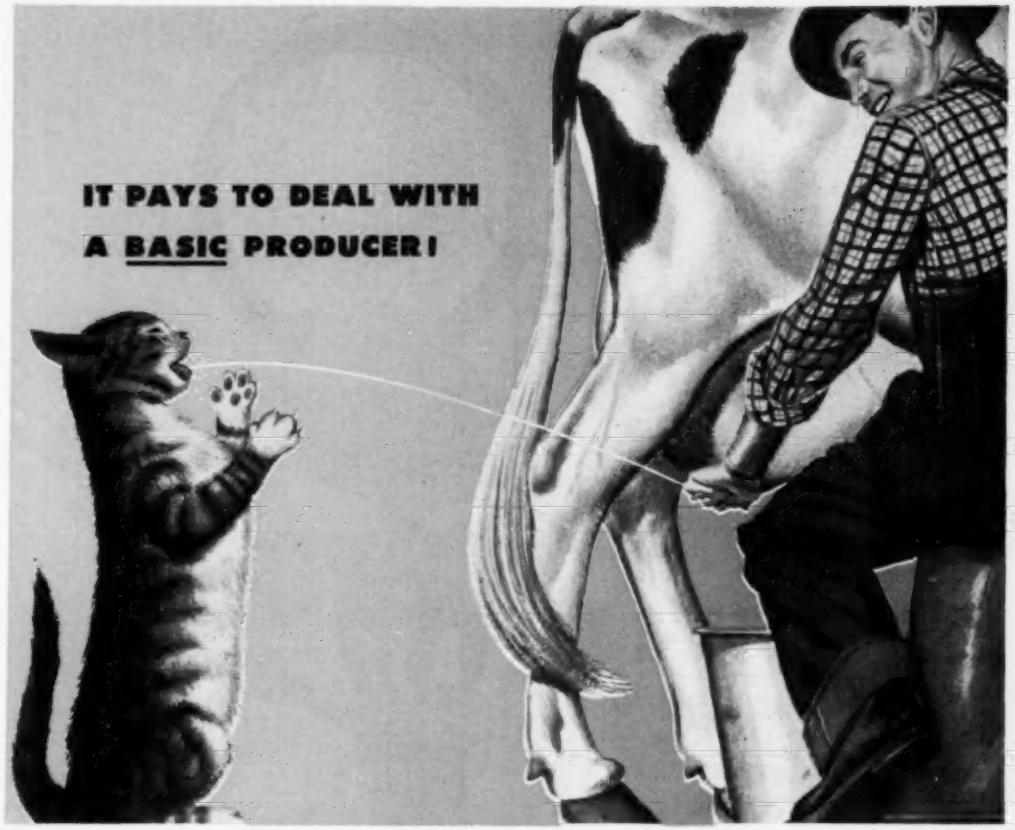
Plants: Newark, New Jersey and Houston, Texas

DIAMOND ALKALI CHEMICALS

LINDANE, the effective multi-purpose insecticide containing 99% gamma isomer of benzene hexachloride is now available in commercial quantities. LINDANE, together with KOLKER high gamma BHC technical, now offer manufacturers basic BHC materials easily handled and readily formulated into high-quality finished insecticides.

DIAMOND ALKALI COMPANY

Chemicals you live by



How about you? If you manufacture finished insecticides, there are many advantages for you in buying directly from PENNSALT — a *basic* producer of chemicals.

PENNSALT offers you a single, dependable source for your technical materials and concentrates. All PENNSALT products are *consistently dependable* — Pennsalt's own research and testing facilities provide quality control from start to finish.

And PENNSALT agricultural chemicals offer you extra compounding benefits, too!

Here are two good examples:

PENTECH, the unique *friable* DDT; made by Pennsalt's patented process for ease of blending and reduced cost of processing.

PENNSALT BHC TECHNICAL 36, with *36%* gamma isomer, proportionately less of the other isomers. This means you handle and store up to ⅔ less of the technical materials.

We'll be glad to send you complete information on prices, delivery and Pennsalt technical assistance; just write to the office nearest you.

Agricultural Chemicals Department
PENNSYLVANIA SALT MANUFACTURING COMPANY
Philadelphia 7, Pa. • Tacoma, Wash.
Bryan, Texas • Montgomery, Ala.
Los Angeles and Berkeley, Calif. • Portland, Ore.

Some Pennsalt Technical Materials & Concentrates:
PENTECH, DDT • PENNSALT BHC TECHNICAL 36 • KRYOCIDE, (natural cryolite) • HI-GAM, 99 (lindane) • DB-50 (50% DDT dust base) • BHC D-12 (12% gamma dust base) • BHC-DDT 9:15 (dust concentrate)

Pennsalt Chemicals

PROGRESSIVE CHEMISTRY FOR OVER A CENTURY

EMCOL H-77

the one emulsifier that is still taking that extra load

AFTER FOUR YEARS of success in the field, easy-to-handle, versatile, low-cost EMCOL H-77 is still the one single emulsifier that carries the most weight with pesticide formulators.

Featuring outstanding "carry-over" stability with required emulsifiability, EMCOL H-77 does the best job with the greatest number of toxicant materials.

Write for the details in our Technical Bulletin No. 31

VIGILANT SERVICE
PRODUCT SUPERIORITY

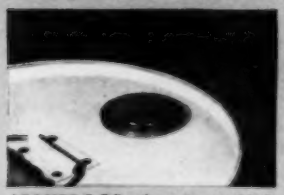
THE EMULSOL CORPORATION

59 East Madison Street • Chicago 3, Illinois

FLEXSPOUT®

Helps Sell *More* of any Product Sold in Steel Pails

BECAUSE CUSTOMERS PREFER THESE FLEXSPOUT FEATURES



LEAKPROOF—One-piece molded plastic, sealed directly on pail metal. Stronger than pail itself.

EASY TO OPEN—Without special tools. Nail, screwdriver or any sharp object does the job.

FLEXIBLE POURING SPOUT—Extends for easy pouring. No muss or fuss . . . because only inside of spout touches liquid.

RE-SEALS TIGHTLY—With plastic screw cap. Protects volatile liquids. Spout retracts for easy stacking.

RIEKE METAL PRODUCTS CORPORATION
AUBURN, INDIANA

FLEXSPOUT simplifies using, pouring and storing your liquid products. It's a powerful sales tool for any liquid that's packaged in steel pails.

FLEXSPOUT is odorless, tasteless and non-toxic. It resists attack by almost all chemicals, solvents and oils. Easily applied with one stroke of a simple hand tool, it permits faster filling and sealing, lowers production costs. For a few cents a pail it adds dollars worth of sales appeal to your products.

Almost all pail manufacturers are equipped to furnish pails ready for use with the **FLEXSPOUT** closure. For more details, prices and a free sample, just fill out and mail the handy coupon.

---MAIL THIS COUPON TODAY---

RIEKE METAL PRODUCTS CORPORATION
AUBURN, INDIANA

We'd like to know more about the new FLEXSPOUT Closure.
Please send us... ☐ Free Sample ☐ Brochure

COMPANY_____
NAME _____ TITLE _____
STREET_____
CITY_____ STATE _____

PYRAX ABB GIVES YOU DENSER CLOUDS, BETTER COVERAGE

Do you know why Pyrophyllite has become the fastest growing agricultural diluent in the last twelve years? . and why more Pyrax ABB is used than *all other Pyrophyllite?*

First, Pyrax ABB is extremely well adapted to aircraft dusting because it forms dense clouds that hug the crop no waste from drifting clouds that settle on adjoining fields.

Second, Pyrax ABB adheres electrostatically, even to the dry underside of foliage you can dust anytime without waiting for proper moisture conditions.

Third, because Pyrax ABB is nonhygroscopic and chemically inert (pH between 6.5 and 7.0), it will not affect the toxic strength of botanicals, DDT, benzene hexachloride, toxaphene, thiocarbamates, or the newer organic toxicants . . . therefore you can use *less* toxicant and *even store these dusts from season to season* without affecting their killing power.

If you need a free-flowing, non-absorptive, neutral, and nonhygroscopic agricultural dust diluent that is always in dependable supply, write today for *all* the reasons why you should be using Pyrax ABB.

R. T. VANDERBILT CO.
Specialties Department
230 Park Avenue **New York 17, N. Y.**

☐ Please send technical information on PYRAX ABB.

☐ Please send sample of PYRAX ABB.

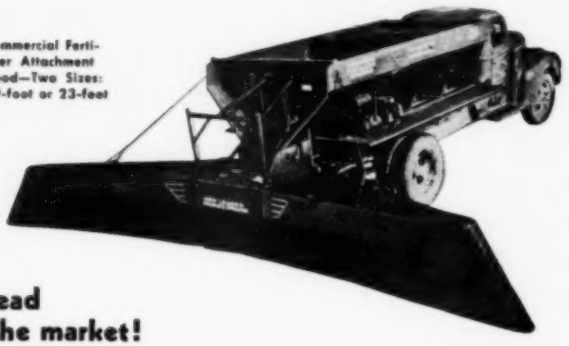
NAME .....

POSITION .....

(Please attach to, or write on, your company letterhead)

HERE'S THE ANSWER TO YOUR SPREADING PROBLEMS!

AGAIN! "The NEW LEADER" leads the field



Commercial Fertilizer Attachment Hood—Two Sizes: 19-foot or 23-foot

with its new "Motor-Driven Spreader" offering greater accuracy of spread with the most positive feed on the market!

SPECIAL ADVANTAGES — Uniformity of spread is not dependent on truck speed. Motor is mounted on catwalk and drives only the twin distributor discs at a constant speed, assuring full width of spread at all times together with uniform distribution.

Conveyor is separately driven from truck drive shaft by a series of V-belts to deliver the correct amount per acre—regardless of truck speed or regardless of whether the truck is driven in low, super-low or any other gear.

Conveyor speed is, therefore, positively synchronized with speed of the rear wheels of the truck and at each revolution of the rear wheels, the conveyor moves a given distance regardless of the truck's speed. Amount of material delivered by conveyor does not vary with hilly or soft field conditions.

Spreader Body Lengths (inside measure) are 9′, 11′, 13′ and 15′. Other body lengths on special order.

Note: When Spreading Attachment is folded up for road-traveling position, width is approximately 7′-5″.

"The NEW LEADER" Self Unloading Bulk Transport

The 20-ton capacity transport above is shown with elevator in place and ready to load a NEW LEADER Spreader truck. These units are proving very profitable; in bad weather they eliminate demurrage on railroad cars; fertilizer gets to the job quickly and spreader trucks can be kept working in the field. The transport, being a self-unloading unit, leaves the tractor truck free to return to pick up another transport load. These units have four individual compartments of 5 tons each. Each compartment may be unloaded independently of the others. Compartments and rear endgate are removable so that bagged and packaged goods may be hauled instead of bulk loads. Capacity 5 tons to 25 tons, lengths from 11 ft. to 40 ft. Written warranty with all NEW LEADER equipment. Write today for specifications, prices, etc. Fast delivery service sells fertilizer!

FREE! Write for "The Story of a Custom Fertilizer Spreading Service"

HIGHWAY EQUIPMENT COMPANY, INC. CEDAR RAPIDS, IOWA

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

passé...

"fruit salad" has
no place in functional packaging

In the merchandising of dry chemicals, as in the design of ladies' hats, it is easily possible to have more packaging than you need.

Over-packaging is expensive any time. Today, more so than ever. As costs rise, it is an increasing drain on profits.

For packages up to twenty-five lbs., many manufacturers of dry chemicals are rediscovering paper bags.

Union CHEM-PAK bags inexpensively provide the kinds of protection most chemical products require. They help sales too. Eye-catchers, they invite featured shelf display.

Look into sift-proof CHEM-PAK — new horizon in chemical packaging.

CHEM-PAK BAGS COST LESS
ALL ALONG THE LINE

- Lower First Cost
- Freight Savings
- Less Handling
- Fewer Losses
- Faster Shelf Turnover

Union's modernized plant of Hudson Falls, N. Y. Billion-bag specialty packaging headquarters

CHEM-PAK BAGS FOR FERTILIZERS—INSECTICIDES, FUNGICIDES, DUSTING POWDERS—PLANT FOODS—WALL SIZE—PASTE FLOUR—PATCHING PLASTER—PREPARED CEMENT—PLASTER OF PARIS—PHARMACEUTICAL CHEMICALS—DYES AND PIGMENTS—SANITARY CHEMICALS—POWDER SHAMPOOS—CHLORINE COMPOUNDS AND ALKALIDES—CAULKING, SEALING, WHITING AND FILLING COMPOUNDS—AND OTHER DRY CHEMICALS WITH COMPARABLE PACKAGING REQUIREMENTS

CHEM-PAK

SIFT-PROOF PAPER BAGS FOR CHEMICAL PRODUCTS

UNION BAG
& PAPER CORPORATION

New York: Woolworth Building
Chicago: Daily News Building

NEW! Mail this coupon for practical CHEMICAL PACKAGE EVALUATOR. No charge or obligation.

Union Bag & Paper Corporation
Woolworth Building, New York 7

Please send me the new Chemical Package Evaluator.

Name_____ Title_____

Company_____

Address_____

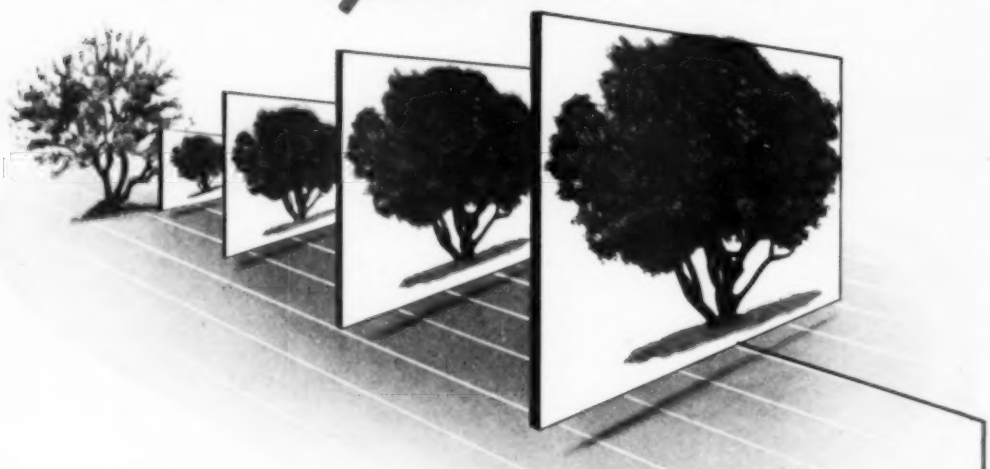
City_____ Zone_____ State_____

Products_____ AC-352

It's a fundamental fact...

SEQUESTRENE

puts the *Green* back into crops



and keeps it there for nine months or longer

Mineral deficiencies in crops have been with us like the unsolved crime down at the police precinct — only longer. Now, for the first time, research presents a bona fide lead toward solving the fundamental problem of how to enable crops to assimilate minerals in which they are deficient and thereby promote better growth and bigger yields.

Sequestrene* iron complexes have corrected one of the most difficult mineral deficiencies to cure, iron chlorosis. Field tests employing formulations of Sequestrene and ferrous sulphate on citrus have transformed yellow leaves to brilliant green and have infused a new rich growth in crops that were dying.

These changes were accomplished within four to six weeks after application and lasted for nine months and longer. The end-result is expected to be bigger yields of better quality.

Many research agencies are continuing to investigate the entire realm of mineral deficiencies including copper, zinc, cobalt, manganese, magnesium and other essential trace elements.

Those interested in the origin of the present work on mineral deficiencies should consult the publications of Stewart and Leonard (1) and Jacobson (2).

Geigy Company, Inc., Insecticide Division, are the exclusive sales agents for Sequestrene in the agricultural field. Write for technical bulletin, "Metal Complexes of Sequestrene* in Plant Nutrition", and pamphlets on iron chlorosis on citrus and reprints of papers by Stewart and Leonard, and Jacobson.

*"Sequestrene" is the registered trademark of the product of Alrose Chemical Co., A Geigy Company.

(1) Stewart, Ivan and Leonard, C. D. Iron Chlorosis — Its possible causes and control. Citrus Magazine 14(10): 22-25, 1952. (2) Jacobson, Louis. Maintenance of Iron Supply in Nutrient Solutions by a Single Addition of Ferric Potassium Ethylenediamine Tetraacetate. Plant Physiol. 26(2):411-413, 1951.

ORIGINATORS OF Geigy DDT INSECTICIDES

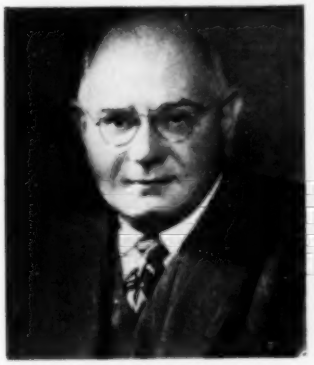
GEIGY COMPANY, INC. 89 BARCLAY STREET N. Y. 8, N. Y.

Aberdeen, N. C.; Burlington, Iowa; Colorado Springs, Colo.; Elkton, Md.; Fresno, Calif.; Houlton, Me.; Leland, Miss.; McGregor, Tex.; Orlando, Fla.; Walla Walla, Wash.

INDUSTRY NEWS

Shell Appoints Selden

J. M. Selden has been appointed manager of the Eastern Division of Shell Chemical Corporation,



J. M. SELDEN

it has been announced by J. Ostermeyer, president.

A native of Pittsburgh, Pennsylvania, and a well-known personality in the chemical trade, Mr. Selden has been associated with the marketing of Shell Chemical products since 1933, first as vice-president and director of R. W. Greeff & Co., agents until 1946 for the sale of Shell Chemical products east of the Rockies, and then as sales manager of the chemical firm's eastern division, created in 1946 along with five subsidiary district sales offices to meet growing demand.

In his new position as manager, eastern division, Mr. Selden will continue to administer sales activities as well as assuming a chief part in the introduction to eastern markets, of new Shell Chemical products still under development.

•

Plans to Market Mulch

The Pacific Lumber Co., San Francisco, is projecting plans for further development of redwood by-products as ingredients of commercial fertilizers and insecticides. Under the trade name of "Palco Pete," the firm has for many years marketed a redwood bark mulch, and is currently sponsoring development work with organic chemical by-products as fertilizer and insecticide components.

Wm. G. Van Beckum has just been named director of research and development for Pacific Lumber.

Since 1948, Mr. Van Beckum has been manager of technical service and assistant sales manager, Special Products Division, Weyerhaeuser Timber Co. of Longview, Washington.

The Pacific Lumber Company has pioneered research in utilization of bark and other wood raw materials. Mr. Van Beckum will make his headquarters at the firm's San Francisco office.

•

Atlas Opens S. W. Office

The opening of a new office in Houston, Texas, to provide additional service for users of its industrial chemical products has been announced by the Atlas Powder Company of Wilmington, Del.

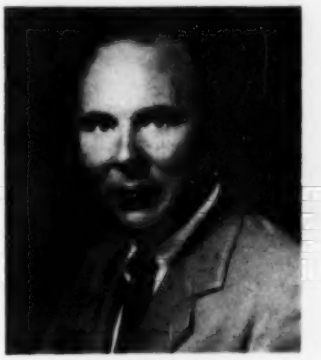
George J. King, director of sales of the company's Industrial Chemicals Department, said that the new office will make Atlas technical service more readily available to industries in Texas, Louisiana, Colorado, New Mexico and parts of Mississippi.

Allen V. Riley, Jr. had been assigned as technical sales representative in this office. He is a graduate of the University of Minnesota and a veteran of World War II, and has been with Atlas since 1948. Prior to this assignment he was attached to the firm's Chicago sales office.

Mr. King explained the move as the latest in a series of steps planned to expand the services of the department, which manufactures and markets surface active agents, plasticizers and other products used by a variety of industries.

Gidney U. S. Potash V-P

Dean R. Gidney has been appointed vice-president in charge of the sales department of United States



DEAN R. GIDNEY

Potash Company, according to an announcement by Horace M. Albright, president and general manager, speaking for the board of directors of the company.

Mr. Gidney, 36, has been in the sales department of the company since 1938, except when on a long leave of absence for war service in the Navy. He was graduated in 1936 from Dartmouth College where he was elected to Phi Beta Kappa. For one year he was employed by the United States Trust Company in New York and in 1937 he joined the United States Potash Company's New York office.

Mr. Gidney, who held a reserve commission in the United States Navy as Ensign, was called to active duty early in 1941. He served in the North and South Atlantic and for two years in Europe with the landing craft staff preparatory to and following the invasion of France. He went on inactive duty as Lieutenant Commander in January, 1946, and rejoined United States Potash. He was advanced to sales manager in 1950. As vice-president he succeeds J. E. Barnes who retired because of ill health several months ago.

Monsanto Opens New Laboratory

Establishment of an agricultural and biological research installation at Creve Coeur, Mo., has been announced by the Organic Chemicals Division of Monsanto Chemical Company.

The facilities, to be known as the "Creve Coeur Laboratories," are in addition to the division's 257-acre Hazelwood Farms established earlier this year to field-test agricultural chemicals. Operations on Hazelwood Farms will be handled by personnel of the Creve Coeur Laboratories.

Initially, the staff at Creve Coeur Laboratories will consist of three research groups under the direction of L. E. Weeks, P. P. Wallace and Dr. O. DeGarmo. The groups will engage in research on soil conditioner applications; herbicides, insecticides and fungicides; and mycology, bacteriology and industrial preservation, respectively.

In addition to the laboratories proper, the installation includes 10,000 square feet of greenhouses for screening and experimental work.

New Indian DDT Plant

A new DDT plant is to be built in India with funds from the Indian government, the World Health Organization and the United Nations International Children's Emergency Fund, the WHO has announced. Signing of an agreement for building the plant in Delhi were completed late in July. Capacity of the plant is reported to be 700 tons per pear.

Although American producers of DDT are protesting, three additional DDT plants are being planned for erection in Pakistan, Ceylon and Egypt in addition to the one already agreed upon in India.

According to terms of the agreement, the Delhi plant is to be in production in March, 1954 and the total output will be devoted by the Indian government to malaria control programs. The agreement is said to contain provision for the training of persons from other nations in the manufacture of the insecticide.

Of the $821,000 cost, the government of India is reported to contribute $471,000; the U. N., $250,000 and WHO, $100,000.

•

UK Fertilizer Output Cut

A cut in the output of sulfate of ammonia at the Billingham-on-Tees plant of Imperial Chemical Industries in England, has been announced. The 25% reduction is attributed to a seasonal falling off, plus increased competition from abroad. However, the company's manager declares that the production cuts are not "panic measures," but rather a balancing of output with expected sales.

•

Adds to Soils Staff

Announcement has been made of the appointment of Tsuneo Tamura to the staff of the soils department of The Connecticut Agricultural Experiment Station, New Haven. He will be assistant soil scientist. Mr. Tamura fills the position left vacant by the resignation of Dr. Gerard A. Bourbeau, who is presently on assignment with the Economic Cooperation Administration in the Belgian Congo.

•

Study Peach Canker in N. J.

Appointment of D. Fred Cohoon to a graduate fellowship for research on peach canker has been announced by Dr. W. H. Martin, director of the N. J. Agricultural Experiment Station, New Brunswick.

Mr. Cohoon is a graduate of the University of Western Ontario, London, Ontario, and has studied the use of antibiotics in controlling plant diseases. He will work under the direction of Dr. R. H. Daines, of the Plant Pathology Department.

•

Davison Appoints Clark

Chester F. Hockley, president of the Davison Chemical Corporation, Baltimore, has announced the appointment of Raymond S. Clark as counsel for the Company. Mr. Clark is a graduate of Groton, Harvard College and Yale Law School and was engaged in private law practice before joining Davison in June of last year.

•

Cyanamid Names Lapean

Raymond E. Lapean, executive vice president of Chemical Construction Corporation, was named managing director of Cyanamid Products Ltd., according to an announcement by American Cyanamid Co., parent firm. Mr. Lapean has been with Chemical Construction since 1940, when he became special assistant to the president. He was elected vice-president in 1944 and executive vice-president in 1950.

•

UCC Appoints Ross

J. W. Ross has been appointed Philadelphia district manager for Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, it has been announced by W. F. Reich, Jr., vice-president. Mr. Ross, who joined UCC in 1936, came to Philadelphia from Atlanta in 1944. He moves up to fill the position formerly held by R. M. Joslin, Jr., now midwestern division manager in Chicago.

Becomes Asst. Sales Mgr.

JOHN CROWTHER

T. A. Haschke, sales manager, Stauffer Chemical Co., has announced the appointment of John Crowther as assistant sales manager as of August 1, 1952. Mr. Crowther has been associated with Stauffer for 7 years and was director of eastern division research, at Chauncey, N. Y. Mr. Crowther is a chemical engineer and a member of the American Institute of Chemical Engineers, Commercial Chemical Development Association and Chemists' Club. Before joining Stauffer, he was a Major in the U. S. Air Force, Headquarters, 8th Air Force in Europe.

•

Emerson Joins Stauffer

Stauffer Chemical Company has announced the appointment of Dr. Frank H. Emerson as technical advisor of agricultural sales. Dr. Emerson received both his Bachelors and Masters degrees in botany from the University of Kansas and was awarded his PhD from Cornell University for work done there in plant pathology. Before joining Stauffer Chemical Company, Dr. Emerson acted as research assistant at the New York Agricultural Experiment Station in Geneva, New York. His home office with Stauffer will be in New York.

•

New Monsanto Salesmen

Monsanto Chemical Company has announced the appointment of five territory salesmen for its new Merchandising Division.

Gordon Staub of Dearborn, Mich., and Donald D. Reichert of Cudahy, Wis., were assigned to the Chicago district, William R. Bone of Sullivan, Ill., was assigned to the St. Louis district, William P. Sheppard of St. Louis was assigned to the New England territory and Richard T. Bethel of Montclair, N. J., was assigned to the New York territory. The newly formed Merchandising Division is handling the sales of Krilium soil conditioner and other trade-marked products through retail channels.

•

Riis Succeeds J. H. Friend

The resignation of J. H. Friend, vice-president of International Paper Company and general manager of its Southern Kraft Division, was announced on August 12, by John H. Hinman, president. Mr. Friend will continue to serve as a member of the board of directors and will be available in a consultant capacity on special projects.

Succeeding Mr. Friend as general manager of the Southern Kraft Division will be Erling Riis, vice-president and assistant general manager, Mr. Hinman said.

Mr. Friend, a native of Wisconsin, became associated in March, 1924, with the late R. J. Cullen and joined International Paper Company in 1927 when the Louisiana Pulp and Paper Company of Bastrop, Louisiana, was purchased.

Mr. Riis was born in Christiania, Norway, and received his education in that country, graduating as a mechanical engineer in 1909. He joined International Paper in 1927.

•

Stops Sale of "Loamium"

Sale of "Loamium" soil conditioner is illegal in the State of Virginia following a ban on the product by the state Department of Agriculture. Commissioner Parke Brinkley stated that the action was taken because "the product does not meet the requirements for fertilizer in Virginia."

•

H. J. Baker Exec. Dies

J. Bailey Pratt, Jr., sixty-one, a senior executive of H. J. Baker & Bro., import and export firm, New York, died at Manchester, Vermont on July 11th, 1952.

Mr. Pratt joined the Baker organization in 1923.

To Gen. Dyestuff Post

TOM R. MOORE

Tom R. Moore has been appointed assistant to the vice-president and general sales manager of the General Dyestuff Corporation, New York, it has been announced. Mr. Moore formerly was sales service manager for the Antara Chemicals Division of General Dyestuff.

A native of Roanoke, Va., Mr. Moore was educated at Virginia Polytechnic Institute and started his career in the chemical industry in 1939 with Sherwin-Williams. In 1941 he joined the National Carbon Company as a sales engineer and became associated with the Antara Division as sales engineer five years later. Mr. Moore was appointed sales service manager in 1950.

•

Gager Joins Kraft Bag

Kraft Bag Corporation, New York, manufacturers of heavy-duty multi-wall shipping sacks, has announced the appointment of James M. Gager, Jr. to its sales staff. He will cover Tennessee, Georgia, South Carolina and part of North Carolina, from headquarters in Chattanooga, Tenn. Mr. Gager has had experience in multi-wall sales and service, and has a practical knowledge of production and operation gained previously as a proprietor of The Gager Lime Company.

•

Davis Heads Association

H. C. Davis, manager of the Bemis Bro. Bag Co. paper specialty plant in St. Louis, was elected president of the Industrial Bag & Cover Association, and S. G. Yount, president of the Southland Paper & Converting Co. of Los Angeles, vice-president for the year ending in June 1953.

Accepts NPA Position

GEORGE J. BRUYN

George J. Bruyn, manager of Niagara sales office of Hooker Electrochemical Company, has been appointed chief of the Alkalies Section, Inorganic and Agricultural Chemicals Branch of the Chemical Division, National Production Authority, as of August 1, 1952.

The appointment is temporary, and Mr. Bruyn will be in Washington until April 1st, 1953. He has been granted a leave of absence by the Hooker Company for the tenure of the appointment. During World War II he worked closely with the War Production Board on allocation of Hooker chemicals required for military purposes.

•

Keen Named to USDA Post

F. P. Keen, Bureau of Entomology and Plant Quarantine, has been appointed special asistant to the leader of the Bureau's Division of Forest Insect Investigations, the U. S. Department of Agriculture has announced.

Mr. Keen, with headquarters at Berkeley, Calif., will be responsible for coordinating more effectively the research, survey, and control activities of the Division in the eastern States. He has been in charge of forest insect investigations and technical supervision of insect control projects in California, and is being replaced by C. B. Eaton.

•

Am. Potash Buys Eston

American Potash & Chemical Corp. has acquired all of the outstanding capital stock of Eston Chemicals, Inc., of Los Angeles in exchange for 22,837 shares of American Potash Class B stock, Peter Colfax, president, has revealed.

Eston Chemicals, which will become a division of American Potash, manufactures agricultural and industrial chemicals, refrigerants and aerosols, with sales in the first half of 1952 aggregating $1,400,000. The company has facilities at Vernon and Torrance.

There will be no change in policies, products or personnel of the Eston division, but the broader facilities of American Potash and Chemical Corporation will enable Eston to expand and strengthen its activities.

Alfred M. Esberg, head of Eston since 1934, has been elected a vice-president of American Potash, and George S. Wheaton, vice-resident, has been named as assistant vice-president.

•

Union Bag Ups Nelson

Union Bag and Paper Corporation has announced the appointment of E. T. Nelson as assistant western district sales manager for multiwall bags. He will headquarter in the company's Chicago office.

Mr. Nelson joined the Union organization in 1928. Prior to his new appointment he had been a field representative for Multiwall bag sales in the Minneapolis area.

•

Attends French Meeting

H. L. Woudhuysen, of the New York firm H. L. Woudhuysen & Associates, planned to fly to Paris, France, on September 12th to attend the 3rd International Congress of Crop Protection, to be held from September 15th to 21st in the Sorbonne University. Mr. Woudhuysen was also present when the first meeting of this kind took place at Louvain, Belgium in 1946.

•

CFA Offices Move

Headquarters of the California Fertilizer Association have been moved to a new location, according to an announcement by Sidney H. Bierly, executive secretary of the group. The new location is suite One, Boothe Building, 475 Huntington Drive, San Marino 9, Calif. The former executive offices were on District Boulevard, Los Angeles. The new address was effective as of August 1, 1952.

Chase Names New S. M.

R. F. NORCOTT

R. N. Conners, vice-president and general sales manager, Chase Bag Co., has announced the promotion of R. F. Norcott to sales manager of the Chase sales organization in Milwaukee. Mr. Norcott, with Chase more than twelve years, was formerly a salesman in Buffalo and Chicago. Mr. Norcott assumed his new post August 1st.

•

New Production Method

The Stauffer Chemical Company has announced that it has obtained exclusive American rights to a new process for the production of ammoniated superphosphate. This process, developed and patented by Rumianca, Societa Per Azioni, Turin, Italy, produces a pelleted material containing nitrogen and phosphorous in amounts which can be varied over a wide range, depending on demand.

About the same proportion of phosphate is water soluble in the material made by this process as in single superphosphate. The material may be bagged or shipped without the aging period usual in superphosphate manufacture. This reduces the cost of the plant by eliminating the need for storage facilities for curing single super. The capacity of existing plants may be enlarged by the use of this process without the need for additional storage. The raw materials are the same as in the standard processess—phosphate rock, sulphuric acid and ammonia.

The process will be made available to other producers under sub-licensing agreements, Stauffer says.

Books and other Aids...

Handbook of Agricultural Pest Control

by S. F. Bailey and L. M. Smith

190 pages, 3.25 in U.S.A.

A practical handbook for the custom spray operator, the pest control operator, farm advisor, agricultural chemical salesman and field worker. This handbook covers the agricultural chemicals (insecticides, fungicides, herbicides, plant hormones and nutrient sprays, defoliants, etc.), their rates of application, useful formulas, as well as chapters on fumigation, spray machines, toxicology, dusts and dusting, aircraft, and mosquito control.

The book is pocket sized (5 x 7½ x ½ inches), bound with a flexible leatheroid cover, for convenient, practical use. It includes more than 100 tables for practical everyday use. Conversion formulas and examples illustrate application to specific uses.

Insect Control by Chemicals

by A. W. A. Brown

817 pages, price $12.50

817 pages. This text traces the relation between molecular structure and toxicity; classifies the insecticides and gives their chemical, physical properties; discusses the hazards to avoid in formulation, mixing and use of compounds; and illustrates modern application equipment, including nozzles; sprayers, blowers, etc;

The Chemistry and Action of Insecticides

by H. E. Shepard

504 pages, price $7.00

This new book gives a vast wealth of information on insecticides—their chemical, physical, and toxicological aspects. Helps the chemist determine their important applications and their effects upon insects. Gives history, commercial importance, major uses.

Covers these chemical groups: Arsenical Compounds; Fluorine Compounds, Sulphur Compounds; Copper Compounds; Inorganic Substances; Nicotine; Rotenone; Petroleum, Soaps, Creosotes; Synthetic Organic Insecticides. ...

Destructive and Useful Insects Their Habits and Control

by C. L. Metcalf and W. P. Flint

1071 pages, price $10.00

This authoritative guidebook covers hundreds of both useful and destructive insects—treating the inner and outer structure and form of general species—explaining their eating and breeding patterns, and life cycles—telling you how to recognize them in any stage of development.

Here are descriptions of more than 500 types of insect pests of the U. S. and Southern Canada. The insects are grouped in accordance with the crops, animals, or products they attack. For each insect you are given recognition marks and types of injury it does to man—enabling you to determine exactly *what* insect is damaging your crop, and supplying you with the most effective means of dealing with it.

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- ☐ The Chemistry and Action of Insecticides—$7.00
- ☐ Destructive and Useful Insects—$10.00

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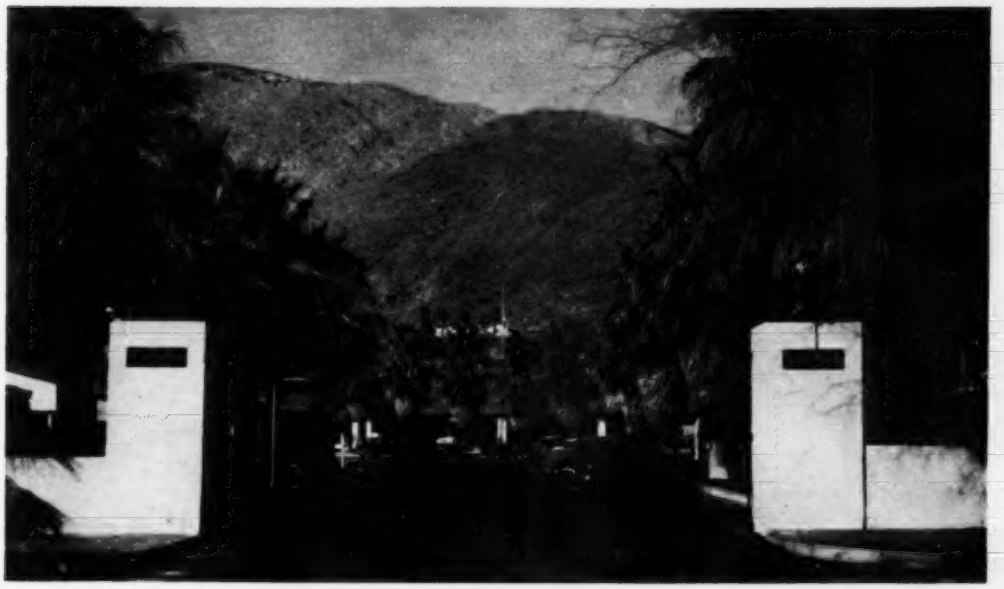
California Fertilizer Assn. Plans November Meeting



MEETING at the Desert Inn, Palm Springs, Calif., the California Fertilizer Association plans to hold its annual convention November 10-12, according to Sidney H. Bierly, executive secretary and manager of the Association.

This year's meeting will mark the first time the group has met at the Desert Inn (pictured above) and according to information from the Association's new headquarters (at Suite 1, Boothe Building, 475 Huntington Drive, San Marino 9, Calif.) the November gathering will be the largest ever held by the CFA.

Detailed plans for the meeting had not been announced by the Association at press time, but officials declared that speakers representing a wide scope of agriculture would be on the agenda.

CFA president is S. B. Tatem, Swift & Co., Los Angeles; B. H. Jones, Sunland Industries, Inc., Fresno, is vice-president; William E. Snyder, treasurer, and Mr. Bierly, secretary.

The Association has invited all industry people and others interested in agriculture to attend. Hotel reservations are to be made by the individual and Mr. Bierly has advised making reservations as early as possible.

Picture-Story of CFA

The October issue of *Agricultural Chemicals* will carry a picture story of plants and people who make up the California Fertilizer Association. Watch for it in the next issue. —Ed.

Phillips Personnel Shifted

Five personnel changes in the Bartlesville office of Phillips Chemical Company, effective August 15, 1952, have been announced by K. S. Adams, chairman, and Paul Endacott, president, of Phillips Petroleum Company.

Edward Dolezal, chief mechanical engineer, will be assigned to the newly-created post of chief project coordinator. Austin Morgan, assistant chief mechanical engineer, will succeed Mr. Dolezal as chief mechanical engineer.

T. M. Hipp, presently on assignment on an ammonia plant construction near Houston, Texas, will be transferred and assigned to the newly-created post of chief construction engineer.

M. W. Bennett, office manager, will be assigned to the newly-created position of chief economics engineer, and M. W. Monk, assistant office manager, will succeed Mr. Bennett as office manager.

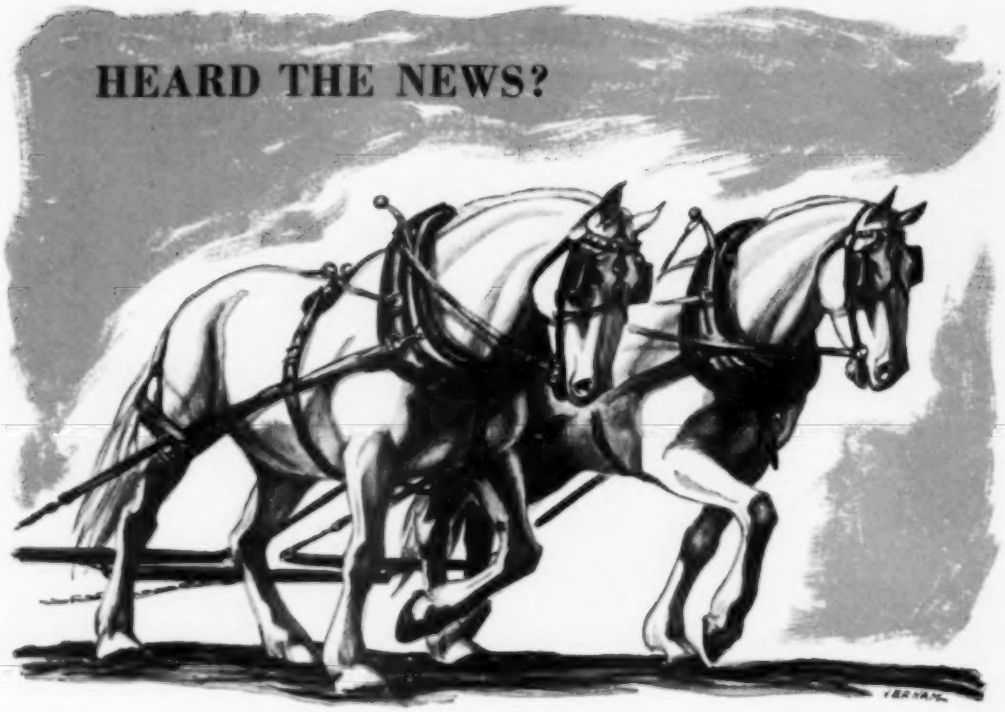
•

Cotton Conference to Cal.

Progress in cotton irrigation and harvesting will be highlighted at the 1952 Beltwide Cotton Mechanization Conference to be held October 22-24, at Bakersfield-Shafter, California.

Field demonstrations will be presented at the Cotton Experiment Station at Shafter to supplement the mechanization discussions at Bakersfield.

Sponsor of the event is the National Cotton Council, Memphis, Tennessee.



We're one team now to serve you better

You have probably heard of the recent purchase of Julius Hyman & Company by the Shell Chemical Corporation. Here's *additional* news about our plans for more efficient service to you:

Julius Hyman & Company Division of Shell Chemical Corporation will market the powerful insecticides, aldrin and dieldrin, as well as the unique soil fumigants, D-D and CBP-55. It will also market on the West Coast Shell Chemical's long-established line of spray oils.

Headquarters for Julius Hyman & Company Division will be in Denver, Colorado, with area sales offices associated with the Shell Chemical offices in New York, Atlanta, Chicago, Houston, St. Louis, San Francisco, Los Angeles and Denver.

The Julius Hyman representative in your area will keep you informed on developments pertaining to our growing line of agricultural chemicals. *He can be a valuable ally in today's dynamic agricultural marketing picture and he stands ready to serve you.*

Julius Hyman & Company Division
SHELL CHEMICAL CORPORATION
Chemical Partner of Industry and Agriculture
P. O. Box 2171, Denver 1, Colorado

Hall Forms New Company

J. Newton Hall, formerly vice-president in charge of sales for Julius Hyman & Co., has just organized a new firm which, operating under the name of Pioneer Chemical Associates, will act as consultants, brokers and marketers, specializing in insecticides and other agricultural chemicals and raw materials therefor. Offices are being opened at 3035 East Colfax Ave., Denver 6, Colorado, telephone FRemont 8839.

As a part of its brokerage and marketing services Pioneer will use its own labels and brand name on some products. This arrangement will allow for maximum flexibility in selecting shipping points, intermingling of supplies from different sources and consolidating regional requirements. Mr. Hall indicates that such flexibility should result in economies and improved service to buyers. Quality standards will be checked and controlled by Pioneer's own technical personnel and by independent laboratories.

Details as to the company's other personnel and branch offices will be announced shortly.

•

Bagpak Opens K. C. Office

International Paper Co., has opened a new Bagpak Division sales office in Kansas City, Kansas, R. I. LaMarche, division sales manager, announced. W. O. McDuffie has been named to head the new office.

•

Conn. Field Day Held

The Connecticut Agricultural Experiment Station, New Haven, held its annual field day on August 20, with some 800 persons in attendance. Dr. William L. Slate, director emeritus of the station, as principal speaker, praised the Connecticut farmers for supporting and utilizing agricultural science.

It was the growers themselves, who in 1875, were the prime movers behind the effort to establish the Connecticut Station, first in America. Since that time, he said, Connecticut farmers have been generous with their time, thought and money in its support. In the earlier days, when the Station lacked lands on which to conduct its experiments, the farmers were quick to offer their farms for its purposes, often supplying labor and tools as well.

This pattern has continued, the retired Experiment Station Director reported, and today many of the Station's field trials are conducted on the farms of commercial growers.

Mr. Slate was introduced by Dr. James G. Horsfall, present director of the Station, who also introduced to the field day audience, Dr. Paul J. Anderson and members of his staff. Dr. Anderson has, for 27 years, headed the station's tobacco research at its Windsor Tobacco Laboratory. Emphasis at the 1952 field day was on tobacco, with many special exhibits and demonstrations on this crop arranged.

In addition, field day visitors inspected experimental plots where research on plant breeding, disease and insect control, soils and forestry, is in progress.

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at lowest cost always specify uniform Palmetto Clay. Natural deposit purity combine with modern production and quality control to bring you the finest low cost extender.

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Compare quality controlled Palmetto Clay with your present diluent. Send for a working sample today.

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Less than 0.50% retained on a 325 mesh screen. Virtually eliminates abrasion.

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Make this test, mix 25 grams of Palmetto diluent in 225 c.c. of distilled water by stirring 7 minutes in high speed mixer. Then immediately fill a 100 c.c. Nessler tube and note height of solids column after 24 hours.

INTERNATIONAL CLAY CORPORATION

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Joins Ethyl Corp. Sales

ALBERT E. GRIFFITHS

Dr. Albert E. Griffiths formerly of Socony-Vacuum Oil Co., has joined the chemical sales division of Ethyl Corporation, to supervise technical service work connected with agricultural chemicals, including benzene hexachloride and lindane, according to an announcement by Malcolm P. Murdock, general sales manager.

A native of Center Berlin, N. Y., Dr. Griffiths attended Cornell University, receiving his B.S., M.S., and Ph.D. degrees in 1933, 1937, and 1939, respectively. He also studied microchemistry and plant physiology under a fellowship at the Boyce Thompson Institute in Yonkers, N. Y.

Dr. Griffiths was associated with G. L. F., Inc., a farm cooperative of New York, from 1933 until 1935. Returning to Cornell, he served as instructor in vegetable crops from 1935 to 1940, while completing his graduate work. From 1940 to 1945, he was professor of horticulture at the University of Arizona, and was also superintendent of the Salt River Valley Vegetable Research Farm, located at Tempe, Ariz., during that period. Prior to joining Ethyl, he was group leader in the Agricultural Chemicals Section of the Technical Service Department of Socony-Vacuum, with which he was associated from 1945 to 1952.

•

Hold Atomic Energy Meet.

The fourth annual summer symposium on The Role of Atomic Energy in Agricultural Research was to be held August 25-30 at Oak Ridge, Tenn., under the sponsorship of the University of Tennessee. Prominent speakers were scheduled to present papers, including Dr. Nathan S. Hall, professor of agronomy at North Carolina State College; and Dr. Sterling R. Olsen, who is with the regional phosphate laboratory operated at Fort Collins by Colorado A & M College and the USDA.

•

Plan $5 Million Cal. Plant

Filtrol Corp., Los Angeles, has just announced plans for construction, in the immediate future, of a new $5 million plant at Vernon, Calif. for the manufacture of ammonium sulfate fertilizer and high purity alumina. The plant will further process the alumina to produce alumina catalyst, stabilized alumina catalyst and impregnated alumina catalyst. Marketing plans for these products include service to the chemical industry for various catalytic processes such as oxidation, dehydrogenation and ammoniation. Shell Chemical Corp. will market the ammonium sulfate fertilizer output of the plant. Construction is to begin during the fourth quarter of this year, with completion scheduled for a year later. Wright W. Gary is president of the Filtrol Corp.

NOW! Control ALL Major Fungous Diseases of Tomatoes and Potatoes with NEW Du Pont Manzate†

TOMATOES: This single new fungicide now does the job where several different or alternate schedules have been needed to control fungous diseases. It provides such excellent control of early and late blights, gray leaf spot and Septoria that you're sure of higher yields and better-quality tomatoes through a longer picking season.

"Manzate" *is available now in a wettable powder formulation. Research indicates that "Manzate" is effective against a wide variety of fungous diseases in addition to those affecting tomatoes and potatoes. For details, write Du Pont, Grasselli Chemicals Dept., Wilmington, Del.*

POTATOES: "Manzate" also does the job where several different or alternate schedules have been needed to control potato blights. This new chemical gives excellent results when both early and late blight attack at the same time. It provides a complete program for all season long. Several years' tests of "Manzate" have shown greatly increased yields of No. 1 tubers.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

Du Pont Chemicals for the Farm Include: Fungicides: MANZATE†, PARZATE* (Liquid and Dry), FERMATE,* ZERLATE,* Copper-A (Fixed Copper), SULFORON* and SULFORON*-X Wettable Sulfurs . . . Insecticides: DEENATE* DDT, MARLATE* Methoxychlor, LEXONE* Benzene Hexachloride, KRENITE* Dinitro Spray, EPN 300 Insecticide . . . Weed and Brush Killers: CMU, AMMATE,* 2,4-D, TCA, 2,4,5-T . . . Also: Du Pont Cotton Dusts, Du Pont Spreader-Sticker, PARMONE* Fruit Drop Inhibitor, and many others.

*REG. U. S. PAT. OFF.

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FUNGICIDE

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

†Trademark of E. I. du Pont de Nemours & Co. (Inc.)

Opens New Chemical Co.

W. LEROY TRAYLOR

W. LeRoy Traylor, who has been associated with the Stauffer Chemical Company for the past fourteen years, — five years of which was spent in the capacity of vice-president and general manager of the Stauffer Chemical Company of Florida, Inc., and the past two years as sales manager of the parent company's South Eastern Division — announces the opening of his own business, the Traylor Chemical and Supply Company of Apopka, Florida. This firm will carry a complete line of agricultural and industrial chemicals — serving customers in Florida, Georgia, Alabama and Latin American countries.

•

Shell Appoints Boultbee

A. H. Boultbee has been appointed director of manufacturing research for Shell Oil Company, according to F. S. Clulow, vice-president. He will replace D. L. Yabroff, who is returning to Shell Development's research laboratory at Emeryville, Cal., as associate director in charge of chemical products.

Dr. Boultbee was born in Kenora, Ont., Canada, obtained his Ph.D. in chemical engineering from the University of Toronto and then studied at the Imperial College of Science and Technology in London, where he was granted a D.I.C. in chemical technology.

He joined Shell Oil Company as a chemist at Martinez Refinery in 1935.

•

Marathon Ups Brown

G. Blaine Brown has been appointed advertising manager of the Chemical Division, Marathon Corporation, Rothschild, Wisconsin, the company has announced. Mr. Brown joined the chemical division in 1942 and shortly thereafter entered the Air Force. He was later commissioned and served in the European theatre. On his return from active service he obtained his B.S. degree in chemistry at the University of Michigan and, in 1946, rejoined Marathon in the chemical research staff. He was soon advanced to the position of chief control chemist. Because of his particular abilities he was later transferred to the sales department in the capacity of sales service supervisor.

The company has also announced the appointment of Frank G. Morman in charge of sales in New England and the Northeastern states.

It's a Good Mixer!

Nitrogen is in great demand. Even Phillips tremendous capacity isn't equal to today's requirements. But we're making four different kinds of high-quality nitrogen material for mixers and farmers.

1. AMMONIUM NITRATE . . . Phillips *66* Ammonium Nitrate contains 33% N. Small, coated, uniform pellets flow freely and resist caking.

2. NITROGEN SOLUTIONS . . . there are three Phillips *66* Nitrogen Solutions for use in the preparation of high-analysis fertilizers and the ammoniation of super-phosphate. These solutions keep handling costs low . promote rapid, thorough curing.

3. ANHYDROUS AMMONIA . . . Phillips *66* Agricultural Ammonia contains 82% N. Convenient, economical source of nitrogen for fertilizers.

4. AMMONIUM SULFATE (see photograph and description above.)

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OMAHA—WOW Bldg. • AMARILLO—First National Bank Bldg. • PASADENA—16 North Marengo Ave. • BARTLESVILLE—Adams Bldg.

Walton Named to Post

CHARLES W. WALTON

Appointment of Charles W. Walton as senior research analyst has been announced by Chemical Construction Corporation. He will specialize in the agricultural chemicals field. Mr. Walton, a retired Colonel of the United States Army, was recently the representative in Italy for Griffith Laboratories, Inc., where he established a sales agency for the firm. He was also a consultant and representative of several other firms.

During his military service, Mr. Walton was chief of operations and Administration of the United States Air Force Service Command, Mediterranean Theatre of Operations, fom 1943 to 1945; Vice President, Economics, Allied Commission Italy in 1945 and 1946; and Comptroller, Air Defense Command, with headquarters at Mitchell Field from 1946 to 1947. He received a B. S. degree in agriculture from the University of Wisconsin and an M. S. degree from the Harvard Graduate School of Business Administration.

•

Information on Borer

"Battle of the Borer" is the title of an article in the August issue of "Monsanto Magazine", published by Monsanto Chemical Co., St. Louis 4. The illustrated article reviews the life cycle and breeding habits of the borer, and tells of the outlook for holding the pest in check through scientific farming methods and insecticides.

•

Sprayer, Duster Assn. Elects

R. B. Chapin, president of the R. E. Chapin Mfg. Works, Inc., Batavia, N. Y., was reelected president and chairman of the executive board of the National Sprayer & Duster Assn. at its recent annual meeting. H. F. Brandt, president of the Dobbins Mfg. Company, Elkhart, Indiana, was reelected vice-president and vice-chairman of the executive board. D. P. Lewis, secretary of the H. D. Hudson Mfg. Company, Chicago, was reelected association treasurer. Frank J. Zink and Earl D. Anderson of Frank J. Zink Associates, Chicago, were reelected respectively counsel and secretary of the association.

Reelected to the executive board in addition to the officers named were: P. L. Hauser, sales manager, Lowell Mfg. Company, Chicago; C. D. Leiter, vice-president in charge of sales, F. E. Myers & Bro. Co., Ashland, Ohio; R. W. Merritt, vice-president, Root Mfg. Comapny, Malta, Ohio; and T. M. Burton, vice-president, D. B. Smith & Company, Utica, N. Y.

James R. Hile, manager of the insecticide division, Acme Quality Paints, Detroit, was guest speaker at the annual dinner.

The executive offices of the association are at 4300 Board of Trade Bldg., Chicago 4, Illinois.

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That's right, you can *really* be out . . . out in the cold if your product is sifting out of its container, especially when Betner has available a variety of bags that *positively prevent* sifting-out of contents . . . keep contents *in* the bag.

For instance, the Betner "Duo-Tite" Bag is constructed to hold bulk powdered material, particularly chemicals, with positively "no-sift" of contents. Available in a variety of sizes to hold up to 25 pounds, it's folded, glued and heat-sealed to guarantee "sift-proofness." The Betner "Duo-Tite" bag can be pre-printed up to four colors and can also be made with a combination of materials.

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***Plants also located in:* Richmond, Virginia; Paris, Texas; Appleton, Wisconsin; Los Angeles, California**

Use of Chemicals Called Essential for Development of Grasslands in U. S.

AN estimated 15,000 persons turned out on August 20 for the Grassland Field Day, part of the Sixth International Grassland Congress held at Pennsylvania State College, August 17 to 23. In the neighborhood of 1200 scientists from 49 different countries with 40 official representations already were deep in the problems of grassland improvement.

The visiting scientists had an opportunity to experience an important American way of transferring agricultural information from trial plots and test tubes to practical farming fields. The Field Day proved of especial interest to foreign delegations. On the other hand, the visiting farmers inspected the largest display of implements and agricultural chemicals ever assembled for a specific use, in this case for growing forage crops.

Products from all of the major manufacturers of equipment and supplies in this field were on display in addition to booths prepared by various bureaus in the U.S.D.A. and state agricultural experiment stations. Exhibitors totaled between 60 and 70.

Philip V. Cardon, former administrator for the Agricultural Research Administration and chairman of the official United States delegation, was raised from temporary to permanent president of the Congress at the opening plenary session. Vice-presidents elected were: C. A. Volio, Minister of Agriculture, Costa Rica; and J. Griffiths Davies, Div. of Plant Industry, C. S. and I. R. O., Canberra, Australia.

During the week, more than 200 papers were read in English, French or Spanish, the official languages of the Congress, in a dozen different sections. Broad topics ranged from the genetics and breeding of forage crops through soil management and the harvesting and preservation of forage. A number of joint sessions, workshops and tours of the campus and college farms were arranged.

Ag. Chemicals Discussed

SINCE world-wide problems were under study, many new and varied uses of agricultural chemicals were discussed. Fertilizers had an important place in the program but supplementary materials also were given consideration. Experiments on the range lands of peninsular Florida, conducted by J. R. Neller of the Station at Gainesville, show that sulfur must be applied at least once a year for good growth of leguminous forage. The amount of sulfur contained in mixed fertilizer is decreasing, he pointed out, and sulfur-deficient soils in the United States are wide-spread. Leguminous forage requires about 5 pounds of sulfur per ton per acre for good growth, he said.

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Bagpak also furnishes Bag Closing Machines. For details about bags and machines write to Bagpak Division, International Paper Company, 220 East 42nd St., New York 17, Dept.

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in the soil which are transmitted to forage crops cause a wasting malady among sheep in South Australia, D. S. Riceman of the University of Adelaide reported. Correction of these deficiencies is brought about by a single dressing of the land with $ZnSO_4 \cdot 7H_2O$ and $CuSO_4 \cdot 5H_2O$, each applied at 7 pounds per acre.

With the phenoxyacetic acid derivatives, M.C.P.A. and 2,4-D, it is possible to kill a wide range of pasture weeds, according to J. Strykers, State Agricultural College, Ghent, Belgium. The most favorable time for controlling the widest range of perennial weeds, he has learned, is at the end of the grazing season in September or October. He has obtained good results from the use of small amounts of active substance applied at different times, either as sprays or mixed with sand. Ammonium nitrate creates a problem in mixed fertilizer used as a carrier for these growth regulators, he has found. Ammonia inactivates phenoxyacetic acid derivatives.

These herbicides have two important uses in Britain, W. G. Templeton, Jealotts Hill Research Station, Bracknell, Berks, England, declared. They are: the removal of weeds from cereal crops undersown with a grass-clover mixture in the establishment of short leys, and in the eradication of perennial weeds in permanent pastures that can not be ploughed. While both fall and spring applications have given good control of weeds in his experiments, the autumn applications on the average have shown increased production of useful herbage the year following application.

Use of weed-free crop seed, prevention of weed seed maturation, adequate fertilization, use of adapted crops, and intelligent management practices were advised by K. P. Buckholtz of the Wisconsin Station. Herbicides show promise of weed control, he said, that can not be easily affected by other methods.

A very small percentage of the compounds tested as herbicides carry through to a satisfactory use stage, W. C. Dutton, Dow Chemical Co., Midland, Mich. stated. It seems reasonable, he commented, that industry should be expected to assume major responsibility in the earlier stages, but industry and public research agencies should cooperate in the advanced stages of the development of a product. Cooperation so far has been excellent, he agreed.

The principal insecticides used on forage crops are aldrin, chlordane, toxaphene and DDT, and in general the dosages required to secure satisfactory results, according to F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A. are not sufficient to adversely affect livestock. However, the presence of any of these materials, particularly in excessive quantities, may result in their excretion in milk or storage in fat. The relationships of the insecticide, formulation, climatic conditions, date and method of application, kind of crop, curing and storage to the extent of residue, all are important, he said.

Use of strong acids, such as sulfuric and hydrochloric, in the preservation of silage is common in Finland, Artturi I. Virtanen, Biochemical Institute, Melsinki, reported. The acidity of forage must be brought to approximately pH4 for proper preservation, he has learned, which is not practicable with protein-rich fodders. Decomposition processes in fodder artificially acidified are slight, he said.

In the field of fungicides for use on special-purpose turf, mercury preparations, long the standard treatment for dollar spot and brown spot, have found worthy rivals in cadmium and thuriam compounds, F. V. Grau, U. S. Golf Association, Greens Section, Beltsville, Md. declared. Development of 2,4-D has advanced knowledge of selective weed control resulting in better turf, he said. Sodium arsenite is gaining in popularity among professional greenskeepers while potassium cyanate is making friends among laymen, he commented.

•

N. Y. Conference Date Set

Dates for the annual New York State Insecticide-Fungicide Conference have been set for November 11, 12, and 13, according to officials of the group. Program details have not been announced as yet, but the meeting will be held, as usual, at Cornell University, it was indicated.

•

Speakers Bureau for CFA

The California Fertilizer Association, Los Angeles, Calif., has announced the formation of a speaker bureau to meet the demand for qualified speakers on the use of commercial fertilizers before farm organizations, nursery and floriculture groups, home gardener organizations, service and women's clubs, etc.

•

Okay Chemical Corp. Terms

Chemical Corp. of Colorado, Denver, which has been threatened with bankruptcy, has worked out an arrangement with its creditors under which the company will continue to operate. Some $285,000 in unsecured debts will be paid off on the basis of 33⅓¢ on the dollar, 11% of the total claims to be paid immediately in cash and the balance in notes payable within two years. Claims of four secured creditors did not figure in the hearings. The major creditor was a bank whose claim for $219,459 due on loans was secured by accounts receivable of $316,463 and a merchandise inventory of $55,098.

The company's difficulties resulted in part from some $92,000 in damage suit judgments obtained by Texas cotton farmers who charged that their crops were damaged by cotton insecticides sold by Chemical Corp. of Colorado. A fire in the company's warehouse last August, causing $70,000 damages, was said to be another contributing factor.

•

Phytopaths Meet in Ithaca

Scores of technical papers and the annual fungicide colloquium were on the agenda of the 44th meeting of the American Phytopathological Society, Ithaca, N.Y., September 7-10.

The colloquium, featuring talks by industry leaders and offering manufacturers the opportunity of introducing new materials to the trade,

was to be held on Tuesday evening, September 9th. Dr. L. Gordon Utter, Phelps Dodge Refining Corp., New York, was to be in charge of this portion of the program.

Dr. George L. McNew, managing director of Boyce Thompson Institute for Plants Research, APS president, was scheduled to preside at the opening sessions.

•

NFA "Meter" Offered

A new "Plant Food Meter" has been made available to the fertilizer trade by the National Fertilizer Association, Washington, D. C. The meter consists of a plastic "sleeve" with open ends so that the cardboard inside may be moved up or down. Printed on the card is information regarding the removal of plant food from soil by many different crops, at a certain number of pounds, tons, or bushels per acre.

The meter has space for imprinting a dealer's name, the Association says. This offers the opportunity of an advertising piece that will keep customers aware of the need for replacing plant food as it disappears from the soil with crop removal.

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L. A. Kolker Retires

Leon A. Kolker, president and founder of Kolker Chemical Works, Inc., Harrison, N. J., retired August 31. The activities of the Kolker company, which is a division of Diamond Alkali Co., will hereafter be carried on by J. G. Brunton, in charge of sales, and Charles H. Kolker, in charge of operations and engineering, under the supervision of A. L. Geisinger, Diamond Alkali vice-president.

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La Forge Rejoins Penick

Harold Noble of S. B. Penick & Co., New York, has announced that Byron La Forge has rejoined the sales staff of the company after an absence of nine months. During this interlude he had been with Chemical Insecticide Corp., Brooklyn. Prior to that time he had been with Penick's insecticide division for thirteen years. He will now be assigned principally to sales work in connection with Penick's essential oil department, with headquarters in New York.

Morrison Joins Summers

Kenneth D. Morrison, recently resigned as president of Naco Fertilizer Company, subsidary of W. R. Grace & Co., has joined the Summers Fertilizer Company, Baltimore, Md., in the capacity of vice-president in charge of sales.

KENNETH D. MORRISON

Mr. Morrison has spent his entire life in the plant food industry. For many years, he was in charge of eastern sales distribution of both foreign and demestic potash producers.

Prior to his association with Naco Fertilizer Company, he was vice-president of The Davison Chemical Corporation.

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Oct. Southwide Conference

The Southwide Chemical Conference to be held at Auburn, Alabama, October 23-25, will devote a major portion of its time to fertilizers.

A symposium, "Advances in Fertilizer Technology" is scheduled for Oct. 24. The advance program indicated that the following would appear on the program:

Dr. John R. Taylor, Jr., American Plant Food Council, Washington, D. C.; George V. Taylor, Spencer Chemical Co., Kansas City, Mo.; Dr. Vincent Sauchelli, Davison Chemical Corp., Baltimore; Dr. J. Fielding Reed, American Potash Institute, Atlanta; Dr. R. P. Thomas, International Minerals & Chemical Corp.; Dr. E. C. Kapusta, National Fertilizer Assn.; and Dr. A. M. Smith, Mathieson Chemical Corp., Baltimore.

Chairman of the symposium committee is J. I. Wear, American Potash Institute; and James A. Naftel, Pacific Coast Borax Co., co-chairman.

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Sulfur Order Relaxed

With the visible supply of sulfur comparatively plentiful, the National Production authority has dropped distribution controls on sulfur and has increased the ceiling on quantities that may be kept on hand by users. Consumers may now keep a 60-day supply on hand, instead of the former limit of 25 days.

The relaxing order came after producers' inventories had climbed by 93,000 long tons since the first of the year. Nearly 100 new projects in the U. S. and other countries are expected to add 4,000,000 long tons of sulfur yearly by the end of 1955.

The International Materials Conference estimates that production in the second half of 1952 will be at an annual rate of 6,400,000 long tons, compared with 5,900,000 in 1950 and 6,140,000 in 1951. Despite

the increased production, it was pointed out that this figure is still short of requirements.

The fertilizer industry was noting with pleasure that relaxation of regulations will permit users to accept shipments of sulfur by barge or vessel, as before.

SHADE TREE

(*Continued from Page 79*)

surface of the leaf brought better control than sprays on the upper surface. The insecticides were readily translocated from one side of the leaf to the other, Dr. Cantelo said.

Before a full auditorium on Wednesday, Dr. Frank E. Egler, consulting vegetationist, Aton Forest, Norfolk, Conn., discussed blanket spraying vs selective spraying for control of roadside brush. In his talk, "Roadside Brush Control — An Application of Plant-Community Management," Dr. Egler declared that "blanket" spraying is obsolete.

He pointed out that several areas of ground are at the side of every highway — the shoulder with no vegetation; the grassy area; and the unmowed grassy area. Before going into large-scale spraying operations, the highway department should be consulted, he said. The unmowed strips are the basic concern, since they are actually abandoned lands. Their growth goes through several stages — from plain soil, to weeds, to grasses, to shrubs to trees, he said. As each new group comes in, it crowds the old out.

Blanket sprays kill all vegetation, he declared, moving the process back to the grass stage. Selective spraying, on the other hand, is a totally different tool, enabling one

to bring back vegetation to whatever stage is desired.

Dutch Elm Disease

PLEADING for a "positive approach" to protect healthy trees rather than removing infected ones, A. W. Hurford, secretary, Connecticut Forest & Park Assn., New Haven, told the group that the Dutch Elm disease can be controlled by coordinated control. A combination of DDT spraying, tree sanitation work and chemotherapy will go far toward halting this threat to the nation's elm trees, he said.

Pre-foliar DDT spraying in early spring is a "must" to save many elms, he said. Research is under way at the Connecticut Agricultural Experiment Station, he said, and is expected to result in better means for control of bark beetle through foliage spraying as a chemotherapeutant.

An educational program is needed to encourage communities to take action on the local level to halt further spread of Dutch Elm disease.

A panel under the leadership of Dr. Malcolm A. McKenzie, director, Shade Tree Laboratories, University of Massachusetts, Amherst, discussed "Some New England Insects and Diseases of Shade Trees and Their Control". Appearing with Dr. McKenzie on the panel, were Dr. David H. Marsden; Dr. Philip L. Rusden and Prof. William E. Tomlinson, all of the University of Massachusetts, Amherst.

Some interesting facts were brought out in the discussion. Dr. Marsden, talking on "Some Common Non-Infectious Diseases of Shade Trees in New England", said that plant pests should not be blamed entirely for all diseases on trees. Nature and man, and their influence on the environment, give rise to numerous non-infectious diseases of trees which challenge the skill of arborists in diagnosis and treatment.

These common, non-parasitic diseases include leaf scorch, needle blight, drought injury, frost injury, storm damage, gas injury, salt injury, spray burn and nutritional deficiencies, Dr. Marsden pointed out.

In his report to the NSTC, secretary-treasurer L. C. Chadwick, Ohio State University, Columbus, pointed out that progress is expected soon by the group's Memorial Research Fund Committee under the joint supervision of the Department of Botany and Plant Pathology of the University of Maryland and the Division of Forest Pathology, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture. The group will study the control of shade tree diseases by adding chemicals to nutient solutions applied to the roots, he said.

In summing up the work of the organization, he reported that the Shade Tree Conference's 1,203 members represent 45 states, the District of Columbia, Dominion of Canada, England, Guam and South Africa.

Commercial exhibits were on display at the hotel and in addition an educational exhibit attracted much attention. These included displays set

Thompson-Hayward's testing lab, under direction of veteran chemists.

Insistence on Integrity!

QUALITY control in pesticides doesn't just happen. It takes sharp, unsatisfied eyes that okay nothing until it has been tested and proved . . . and then okay only that batch. Questioning, testing eyes!

In our laboratories, careful routines are set up for mixing, measuring and packaging. More important, instructions to the chemists go something like this: "Take nothing for granted. Accept no rule of thumb. Approve nothing just because somebody else did." That is our quality control platform.

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up by the University of Massashsutts, University of New Hampshire, Harvard University; the Massachusetts Audubon Society and the U. S. Department of Agriculture.

NIAGARA

(*Continued from Page 49*)

ager, supervising sales throughout the midwest and central south. In 1937, he became assistant sales manager and moved to Medina, New York, where his residence has been maintained since. He is president and director of Quimica Sinaloense S.A. e C. V. of Culiacan, Mexico, a subsidiary; also a director of Pine Bluff Chemical Co., Pine Bluff, Arkansas, and Niagara Brand Spray Company, Ltd., Burlington, Ontario, Canada. During the past several years Mr. Vernon has served as president of the board of education of the Medina schools.

B. Earle Vosteen, vice-president and controller of Niagara Chemical Division and assistant secretary of Food Machinery and Chemical Corporation, joined the Niagara organization in 1928 and moved to Medina, New York from Buffalo, where he was controller of the Beaver Board Companies. He is also an officer and Director of Quimica Sinaloense S. A. de C. V., Pine Bluff Chemical Co., and Niagara Brand Spray Company, Limited. In addition to his duties as controller, Mr. Vosteen is financial officer of the division and acts as administrative assistant to the president.

Stuart H. Bear, a graduate of Pennsylvania State College, in entomology and plant pathology, joined the Niagara organization as a salesman in 1931, working in the Spencerport, New York area. He was later transferred to the midwest, where he served as territory manager until 1937, and then became district sales manager, in which capacity he served until called to Middleport as assistant sales manager of the Division in 1947. Mr. Bear will become vice-president and sales manager of the Division. He is also an officer and director of Quimica Sinaloense S. A. de C. V.

Niagara Chemical Division has one of its major plants located at Middleport, New York and there maintains its administrative and research headquarters. Other production plants operated by Niagara are at Aye, Massachusetts; Jacksonville, Florida; Belle Chasse, Louisiana; Greenville, Mississippi; Harlingen, Texas; Pecos, Texas; Richmond, California; Yakima, Washington; Pompano, Fla.; and Tampa, Fla.

In addition to the above, the following subsidiaries of Food Machinery and Chemical Corp. are operated by the Niagara Division: Quimica Sinaloense S. A. de C. V., Pine Bluff Chemicals Co., Niagara Brand Spray Company, Limited.

The Niagara Chemical Division manufactures, formulates and distributes agricultural chemicals throughout the United States, Canada and Mexico. It also serves the export market in scores of foreign countries.

Bartlett Executive Dies

Clinton C. Lawrence, '59, executive vice-president and a director of the F. A. Bartlett Tree Expert Co., died August 18 at his home in Stamford, Conn. He was a graduate of Cornell University in plant pathology and during World War I, was a second lieutenant in the Army Air Corps. In 1927, he helped found the Bartlett School of Tree Surgery.

OHIO TOUR

(*Continued from Page 77*)

of aphis. The methoxychlor-treated plots were the first to show infestation by aphis and the two-spotted mite. None of the materials were phytotoxic, with the exception of NPD, which caused some injury to potatoes. In general, "Malathon" was not quite as good as parathion, and dieldrin was found best for flea beetle control.

Applications of various fungicidal compounds to potatoes in potato disease control showed SDDC plus zinc sulfate at 4-1-100 to give the best results. DDT was used with the formulations at 2/3-100.

Apple scab control studies, using organic mercury fungicides "after infection", were reviewed by H. F. Winter of the experiment station. None of the mercury-treated trees required further fungicide treatments, due to the good initial control . . . manzate plus sulfur treated trees did need extra fungicide treatments. "Coromere" was found equivalent to "Tag" and "Puratized" in "after infection" applications. "Manzate" treatments seemed to cause some damage by causing a burning of the fruit. Table 2 summarizes some of the preliminary results in apple scab control, on McIntosh variety.

Mite and aphis control on apples indicated that in severe cases of rosy apple aphis, dormant oil sprays are not adequate. Parathion has been most useful against this pest, but it is recommended that application be delayed after the "pink" stage, to allow the parathion to be effective also against other insects. Lead arsenate and DDD are used primarily against red banded leaf rollers. Studies of

the green aphis, indicate that "Systox" is a good aphicide, but does not act as a true systemic on this species.

Among the experiments conducted was a treatment with the "Ukako"* unit . . . against green aphis and other plant pests. The results, seen in table 3, are an obvious indication that the so-called "electronic treatment" is without effect.

In an informal program on dealer problems, M. G. Farleman, Standard Oil of Ohio, reviewed some of the difficulties encountered in selling to the farmer, and particularly some of the inconsistencies in results with products in use. D. L. Kent, Goodrich Chemical Co., Cleveland, pointed out the need of an educational program directed to the actual user, which issue centers on the direction of information to publications reaching the user and dealer. Films on soil and soil conditioners concluded the session.★★

*A reprint of an article explaining the use of the Ukako unit, its theory, and experiments involving its use, is available on request from Agricultural Chemicals, 175 Fifth Ave., N.Y.C.

Toxaphene Toxicity Studied

A REPORT prepared by the medical director of Hercules Powder Co., Wilmington, reviewing the toxicity hazards in connection with the use of toxaphene, and giving suggestions to physicians on the treatment of persons suffering from accidental or careless misuse of toxaphene-containing insecticides, has been receiving considerable attention from newspapers and radio commentators over recent weeks. And as so often results when a company makes a laudable effort to get needed information of this type into proper channels, the uninformed newsmen and their radio counterparts have picked up only part of the story, — the sensational part of course, — and have tended to magnify the toxicity hazard in connection with use of toxaphene insecticides.

The report itself pointed out that effective insecticides must often necessarily be poisonous in nature "and must have lethal qualities if they are to be used in controlling insect pests. As with other economic poisons used in agriculture, one may expect that increasing use of toxaphene will be accompanied by a few rare instances of human poisoning through accidents and careless misuse of the agent."

The complete absence of poisoning in workers who manufacture toxaphene and in those who are exposed to it, both in the compounding of pesticides and its use in agriculture, are cited, however, in the report to indicate that toxaphene can be handled safely.

In the four most serious case histories described in the report, the insecticide was carelessly left where it was found by small children who ate or drank it. In two other case histories, illness resulted when the insecticide was not properly used. All the persons involved in these cases recovered.

In general, the news commentators have ignored the sections of the Hercules report which caution against careless use of insecticides if such tragedies are to be avoided. They

have also failed in many cases to call attention to the fact that the reported poisonings resulted from carelessness and misuse, and have tended merely to stress the idea that toxaphene is pretty dangerous stuff if chomped down diluted only slightly with green vegetables. Where the commentators got their stories is still not completely clear, as they are not normally partial to reading lengthy medical reports. It is indicated however that perhaps a press release issued by the American Medical Association may be the culpable source.

The A. M. A. itself in the July 19th issue of the *Journal of the American Medical Association* (pgs. 1124-1126) carries the full text of the report under the title "Accidental Poisoning By Toxaphene," the authors being L. C. McGee, M.D., and Howard L. Reed, M.D., medical director and assistant medical director of Hercules Powder Co., and Dr. James P. Fleming of Hearne, Texas. The report is summarized as follows:

1. Three deaths in children presumably resulted from accidental ingestion of lethal amounts of an insecticide, toxaphene. A fourth child so poisoned recovered.

2. Two instances of group poisoning, that followed ingestion of toxaphene-sprayed collards and chard, respectively, have come to our attention. Among 10 persons known to have eaten the contaminated greens, in 7 symptoms developed consistent with toxaphene poisoning as seen in laboratory animals.

3. The onset of poisoning characteristically was abrupt and not associated with abdominal pain, involuntary vomiting, or diarrhea. Illness is manifested by a skeletal muscle response to central nervous system stimulation and by loss of consciousness.

4. These instances of poisoning in humans have resulted from accidents or injudicious use of the pesticide.

5. Since similar poisoning may occur in the future, it is essential that physicians recognize the cardinal symptom, a convulsion, and the importance of countering the acute central nervous system stimulation with barbiturates.

6. The complete absence of poisoning in workers who manufacture toxaphene and in those who are exposed to it, both in the compounding of pesticides and its use in agriculture, suggests that it can be handled with safety.

7. This and other effective pesticides are known poisons and must have lethal qualities if there is to be progress in man's war against insects. Such chemicals should be used properly and with precautions against human consumption if tragedies are to be avoided.

To Michigan Chemical Post

ALFRED G. RAUFER

Alfred G. Raufer has been appointed sales director of Michigan Chemical Corporation, Saint Louis, Michigan, effective August 1, 1952, according to an announcement by Roland P. Place, president.

During the past three years, Mr. Raufer has been Michigan Chemical's eastern sales manager. He was for ten years with the Sherwin Williams Company as eastern sales manager of the household insecticide division, and has a broad background in sales work. Mr. Raufer will make his headquarters at the Corporation's main office at Saint Louis, Michigan.

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Joins Development Group

H. A. Hashbarger, development manager of Monsanto Chemical Company's Foreign Department, has joined the development department of the company's Organic Chemicals Division, the company has announced.

Mr. Hashbarger, who has been with the company since 1937, will coordinate Krilium technical information developed by the various departments of the Organic Chemicals Division and will assist A. T. Loeffler, divisional development department director, in communicating findings both within and outside the company.

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"FIFTH PLATE"

(*Continued from Page 59*)

an average year would make unmarketable most of the apples grown in Eastern orchards. Fungicides are widely used to prevent the disease, cherry leaf spot, that completely defoliates trees by mid-summer, reducing the crop that year and sometimes killing the trees. Fungicides have increased the output of anjou pears by 300 million boxes a year. Those, though, are drop-in-the-bucket savings compared with the results yet to be obtained. Fungus diseases are doing an estimated $4 billion worth of damage a year, and to make a real inroad into this loss will take many such developments as the recently announced use of antibiotics to control halo blight of beans.

We use fumigants to protect our stored grains from destructive and contaminating weevils. We could use a lot more. There has been promising research with fumigants in the control of nematodes and other soil pests. Cost has been a deterring factor in the widespread use of soil fumigants, but if they increase yields of valuable crops as much as the research indicates they will, we can look forward to an

expanding use of these chemicals. It may be assumed, too, that when markets increase, costs can be reduced —as so often happens in our economy.

Insecticides offer perhaps the greatest potential for saving the crops we produce on our farms. In many cases, we already *have* the insecticides, and the control methods. We only lack their widespread application on the farm. I believe *insecticides* might give us the fastest and most far-reaching food production increases of all the pesticides.

What can be done with insecticides in a few, limited fields has already been shown. Simply controlling the codling moth in apple orchards with one of the newer insecticides, for example, reduced damage to fruit from 15 percent to about 3 percent and cut down the number of yearly coverage sprays required to 3 or 4 where once as many as 10 to 12 were required.

Grasshoppers are another pest that we now successfully control. If you can recall the '30's, you'll remember that 'hoppers teamed with drouth to destroy the soil cover and cause the loss of millions of tons of our finest midwestern topsoil. And yet, how many realize that we could have had a similarly heavy outbreak of the pests these past few years, if it hadn't been for research and insecticides?

Last year, Oklahoma farmers saved nearly 2 million acres of small grain from the greenbugs by using chemical sprays. But still the aphids got 1.5 million acres of their crops. Insecticides as residual sprays are being used in 50 million homes around the world to control malaria-carrying mosquitoes. The insecticidal control of horn flies on livestock is currently saving us millions of dollars worth of beef alone, each year.

An extensive control program conducted by the Bureau of Entomology and Plant Quarantine and cooperating states has rid Pennsylvania and western New York of the forest-destroying gypsy moth. The use of new agricultural chemicals that can be put on effectively with airplanes, has reduced control costs to less than a dollar an acre — less than 1/25 of that of a few years ago.

The agricultural chemical industry can point with much pride to these records, but there is so much yet to be done. There are more than 6,000 destructive insects in the U. S. chewing and sucking away, for instance, 15 percent of our cotton and 20 percent of our sugar cane every year. The European corn borer and the corn earworm cause millions of dollars worth of damage in the midwest, ruining feed that we need for our livestock. Stored grain weevils are taking from 5 to 10 percent of our stored grains from us.

Hints of what the future holds for some of these 6,000 pests comes to us from experiment station and USDA reports. Iowa and Kentucky, for example, have found that corn yields can be increased 10 to 40 percent by controlling rootworms with insecticide. Cooperative work between the USDA and Virginia showed that the use of insecticides on the soil to control rootworms in peanuts would increase yields 40 percent.

As we continue to expand our grasslands program, the place of insecticides — and other agricultural chemicals — gains importance. Some of the new insecticides for example, have raised yields of alfalfa and clover by more than 30 percent, and, at the same time, improved the feeding quality of the forage. This year, farmers have bettered their production on more than 275,000 acres by controlling a single, serious, forage crop pest —the spittlebug. Insecticides saved nearly a half million acres of valuable range grass from grasshoppers in 1951.

It's apparent that in the years to come, agricultural chemicals will help the farmers fill the fifth plate. It is equally evident that we're all going to have to pitch in together to get the job done.

Our state colleges and the U. S. Department of Agriculture will help by carrying out *fundamental* research in the development of pesticides and by determining how those already available can be used best on the farm. Pesticide people will help by supplying the bulk of the necessary industrial research in the development of new and better pesticides, and by producing them in quantity for distribution throughout America and other countries.

A study group — of which L. S. Hitchner was a member — was set up by Secretary Brannan about a year ago, to analyze and suggest changes in the Department's insect and plant disease control programs. I can do no better than sum up some of their conclusions to indicate to you possible ways we can bulwark our already strong cooperative ties with one another.

This study group recommended that surveys of insect and plant disease infestation be unified and intensified by the federal government, in cooperation with State and local authorities. The group felt that timely surveys that would quickly focus the need for active measures of control or protection in certain areas, could save us much in total production. I can say that we in the Department are working toward the fulfillment of that recommendation. The success of

the cooperative grasshopper control program in Wyoming last year was based on information obtained in such timely, accurate surveys. Today, the USDA is coordinating the efforts of farmers, county agents, and entomologists all over the country to get evidence of local insect and plant disease outbreaks. We believe that in time the value of what is being done now will bring further public support of survey and control activities.

This study group emphasized, too, the need for our agricultural extension services in the various states to take more of the pest control information to the farmers who need and can use it. They believe that losses to insects and diseases were too great and were repeated too often.

It is important that we work together in this educational program not only to inform the farmers how to use pesticides effectively and safely, but also to enlighten the general public about agricultural chemicals — particularly, pesticides. We must inform everyone of the real value of these chemicals and how to use them safely.

A good deal of misinformation about insecticide is being circulated. Some people, on the basis of unfounded fears, are pressing for the establishment of unnecessary limits and even prohibitions against the use of chemicals that are important to farm production and which are safe when properly used. Even automobiles are unsafe when improperly used. The answer is education — not withholding of useful products.

Our objective should be — as the study group recommended — that the farmers and ranchers of this country should so well understand the value of pesticides to them, that they will willingly accept the responsibility of pest control — on their own farms — and in the communities in which they live.

These are some of the tasks before us.

The fifth plate can be filled. We can fill it pretty well through use of insect control alone — and pesticides are a major insect control tool. Practically speaking, we know of course that the job requires the co-

ordinated use of all available tools and that it requires economic conditions favorable to production. Certainly all of us who serve farmers have our work cut out for us.

The pesticide industry's service to agriculture has barely begun. As the nation demands greater production from the farmer, he in turn will demand more agricultural chemicals. Each time he uses agricultural chemicals to build bigger yields and to protect them, he uses with greater efficiency his land, his machinery, his power.

Yes, agricultural chemicals have a great future ahead of them—a future that is wrapped up in the American farmer's ability to produce for the fifth plate.★★

HEPTACHLOR

(*Continued from Page 37*)

garden web worms for which 0.35 lb. actual heptachlor is recommended per acre; and cutworms, for which the recommendation is 0.7 lb. per acre.

Experimental programs are nearing completion regarding the use of heptachlor formulations for the control of insect pests other than those attacking cotton. Promising results have been reported in regard to heptachlor's control of the following pests. The timing of application, dosage and residue levels require further consideration before label registation.

During the past several years, heptachlor formulations have been supplied for experimental evaluation in the control of varied insect pests. Heptachlor formulations are now being tested against the following insects and show effective control with the use of minimal quantities:

Cattle Lice
Cherry Fruit Fly
Corn Billbug
Corn Earworm
Darkling Beetles
Earwigs
Engelman Spruce Beetle
Eye Gnat
Lesser Corn Stalk Borer
Nematodes
Pecan Weevil
Poultry Mite
Squash Bug
Strawberry Crown Moth
Strawberry Root Weevil
Termites
Wheat Stem Sawfly
White Fringed Beetle

Phytotoxicity

IN the course of the heptachlor experimental progress, observations were made to determine evidence of plant injury. No plant injury has been observed or reported using the various heptachlor formulations at different concentrations.

Off-Flavor: Vegetables and fruits treated with heptachlor during the growing season or grown in heptachlor-treated soil were tested for flavor and taste at harvest time. No off-flavor or changed characteristics in taste could be detected.

Analytical Methods

A SPECIFIC method for the determination of heptachlor residues has been developed and is described in basic detail in "Detection and De-

termination of 1,4,5,6,7,8,8-heptachloro-3a,4,7, 7a-tetrahydro-4, 7-methanoindene" by Polen, Percy B. and Silverman, Paul, in *Analytical Chemistry*, 24, 732-735, April, 1952. Heptachlor residues in the order of 0.01 ppm and less are determined by this method.

Heptachlor as the technical grade and in the commonly-used formulations may be analyzed by a method based upon its reaction with silver nitrate or silver acetate in strong acetic acid solution. Under such conditions the method is specific and may be used even in the presence of other insecticides such as DDT, benzene hexachloride and toxaphene.

Crop Residues: Throughout the 1951-52 season Velsicol heptachlor has been used experimentally in the control of insects on the following crops; cantaloupe, alfalfa, range and forage, beets, cabbage, carrots, celery, cherries, corn, cotton, lima beans, onions, peanuts, peas, potatoes (white) potatoes (sweet), strawberries, yams, turnips and rutabagas. Soil analysis was also included.

As soon as these crops are harvested in the various parts of the country complete residue analyses will be obtained. At the present, residue analysis tests on a portion of the crops already completed, indicate that the residues will be in the range of 0.01 ppm or less. These results are being obtained by both the chemical analysis and bio-assay methods.

Toxicity: Like all chlorinated hydrocarbon insecticides, heptachlor should be handled and applied with normal precautions to avoid any possible contamination. Lehman, A. J. in Association of Food and Drug Off., Quart., Bulletin XV (No. 4) 122-133 (1951) reports the LD 50 for heptachlor to the rat as 90 mg./kg. with symptoms of poisoning similar to aldrin, dieldrin and (technical) chlordane.★★

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Amendment Proposed

The following notice of proposed amendment to the regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act is being published in the

Federal Register. Interested persons may file their views within 30 days after the publication of the notice, according to W. G. Reed, Chief, Insecticide Division, USDA, Washington, 25 D. C.

1. Section 162.10 would be amended by adding thereto new paragraphs (h) and (i) to read respectively:

(h) *Duration of registration.*— Unless cancelled in accordance with the provisions of section 4. c. of the act or with the acquiescence of the registrant, or unless continued in effect in accordance with the provisions of paragraph (i) of this section, the registration of an economic poison shall be cancelled at the end of a period of five years following the date of registration of such an economic poison or following the date of any subsequent registered change in formula or labeling or following the date of any continuance of registration pursuant to paragraph (i) of this section: *Provided, however*, that prior to any such cancellation the Insecticide Division shall send to the registrant a notice of intent to cancel, and, in the event such notice is not sent to the registrant 30 days prior to the expiration of the five year period, the registration shall remain in effect until 30 days following the date such notice has been sent to the registrant at his latest address submitted to the Insecticide Division.

(i) *Continuance of registration.*— If a registrant desires to continue the registration in effect, he shall notify the Insecticide Division in writing and it shall be continued in effect under the same terms as the original registration; *Provided, however*, that if, on the basis of information available at the time, it appears that the product or its labeling fails to comply with the act the registrant shall be notified and an opportunity given to make the necessary corrections. If the corrections ae not made, continued registration without protest shall be refused but registration under protest as provided in section 4. c. of the act shall be issued if requested in writing by the registrant.

2. Paragraph (2) of section 162.17 (b) would be amended and new paragraphs (3), (4) and (6) would be added to section 162.17 (b) to read, respectively:

(2) If an economic poison is to be tested for a use which is likely to result in a residue on or in food or feed, a permit for shipment or delivery will be issued only when

(i) The food or feed product will not be used for food or feed except for laboratory animals, or

(ii) Proof satisfactory to the Director is submitted by the applicant that the proposed use will not result in a residue which is hazardous to man or other animals.

(3) A permit for shipment or delivery of any experimental economic poison for testing in any place likely to be frequented by people will be granted only if it is clearly shown in the application for such permit that proper safeguards will be taken to prevent injury to all persons concerned.

(4) All applications for permits covering shipments for experimental use shall be filed in duplicate and must be signed by the shipper or the person making the delivery and must contain the following:

(6) An economic poison intended for experimental use shall not be offered for general sale by a retailer or others, or advertised for general sale.

3. Section 162.17 ((d) would be amended to read:

(d) *Cancellation of permits.*— Any permit for shipment for experimental use may be cancelled at any time for any violation of the terms thereof or if it shall appear to the Director that the permit should be cancelled for the protection of the public.

TECH. BRIEFS

(*Continued from Page 73*)

It has been established that greater uniformity of the application of treating materials has been obtained by the use of the spray treater rather than by the slurry or dry dust

safe-use

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NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

910 SEVENTEENTH STREET, N. W. WASHINGTON 6, D. C.

methods of treating. Since the treating materials used are not water soluble, they are applied as suspensions with the spray treater. Limitations in this method of treating can become serious if due caution is not exercised in the purchase of treating materials. Since dosages of treating materials and the quantity of moisture added to the seed are critical, the orifice size of the spray nozzle is limited. The particle size (5 microns or less) of these materials is, therefore, a definite factor to be considered. Under California conditions, it has been determined that 4% moisture added to processed sugar beet seed in treating is about the maximum allowable quantity. It would be hazardous to apply a greater quantity of moisture in treating because of possible adverse effect on good packaging, on safe tolerance in increased seed size from swelling, and on germination during extended periods of storage.

"The technique of preparing treating materials for spray application to processed sugar beet seed is quite simple. The recommended dosage of "Phygon" is 0.25% on the seed, by weight, and 0.33% for "Isotox Seed Treater." Expressed in weight quantities this is equivalent to 4 ounces of "Phygon" and 5.3 ounces of "Isotox Seed Treater," respectively, per cwt. of seed. The recommended maximum allowable moisture to be added is 4%. Therefore, the above quantities of treating materials plus any dye solution must be contained in two quarts of water (the slight displacement by treating materials is not considered serious). It is suggested that this maximum allowable amount of water be used per unit of 'mix' so that a larger-size nozzle orifice can be used.

The quantity of dye used is 3 to 5 grams per cwt. of seed. A good 'punchy' color can be obtained with 5 grams of the dye mentioned. Using more than this quantity is not recommended since the dye apparently has some influence in increasing the amount of foaming which occurs when the 'mix' is being prepared. (Control of foaming will be discussed later.)

The Holly treating plant makes use of a 25 gallon chemical mixing tank equipped with a manually operated agitator. The tank is located so that its contents can be discharged by gravity into the treater solution tank. In making up 'mix', about 10 gallons of water are run into the tank. One gallon of "Phygon" (weight 11.0 pounds) paste is then added and the contents thoroughly agitated. "Isotox Seed Treater" in the amount of 14.65 pounds is weighed up, slurried with a minimum amount of water and added slowly, with agitation to the "Phygon" paste suspension. One pint of concentrated dye solution containing 200 grams of Victoria Green Dye is then added. The volume is completed with water to 22 gallons. This quantity of 'mix' contains the proper quantity of materials to treat 4400 pounds of processed sugar beet seed. One to 2 ccs. of "Ortho Foam Inhibitor" is added and the contents of the tank thoroughly mixed for several minutes. The 'mix' must be filtered through a 60 mesh screen prior to passage into the

spray treater solution tank. Some foaming will always result, either with or without dye being added to the 'mix', and will impede seriously its flow through the screen. Therefore, the use of the foam inhibitor is recommended. The skimming-off is slow, sloppy and wasteful. Scrubbing of materials through the screen should not be permitted as this promotes serious operational delays from nozzle-clogging during the process of treating. Both conditions are apt to occur if the operator does not control foaming.

As a matter of information, concentrated dye solution can be made by dissolving 200 grams of dye in one pint of methanol. Hot water can be used for the purpose, but the dilution will have to be increased so as to get the 200 grams of dye completely into solution. Methanol applied at the rate of one pint per 44 cwt. of seed had no apparent adverse effect on germination.

In any discussion of the use of a spray treater where orifice size of the spray nozzle is a limiting factor, too much stress cannot be placed upon the absolute necessity for a thorough screening of all treating materials, whether used singly or as a composite mix. The same should be said with regard to the cleanliness of the spraying equipment with particular attention being given to preventing the entry of any foreign materials into the seed treating solution tank and the component feed lines.

As a result of thorough investigations by the Divisions of Pathology and Entomology at the University of California, Davis, as well as from commercial data, it has been established that sugar beet seed treated with "Phygon"-Lindane can be stored for a period of at least 40 weeks without any danger to germination. It has also been found that lindane will remain at least 75% effective in the control of wireworms even after the treated seed has been stored a year.

In certain areas in California where processed sugar beet seed has been stored for any length of time, infestations of the Confused Flour Beetle (*Tribolium*) have been experienced. While the effects on germination from this beetle have not been serious, no sugar beet grower appreciates the presence of a numerous quantity of beetles emerging from a package of sugar beet seed. The treatment of sugar beet seed will prevent such infestations.

PLANNING AHEAD

(*Continued from Page 31*)

to make the necessary chemicals. Except for a few products, all basic raw materials were in ample supply to meet conditions of an extremely heavy infestation of pests. Distribution facilities, streamlined and expanded following the war, were in full operation and could have handled any eventuality in regard to protection of American crops.

The 1952 season, in all its aspects, is not in the least new to those who have been operating in the pesticides field for the past 50 years or even in the last 25 years. Some who entered the industry during the past 10 years, may not have

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anticipated the situation which occurred during the season.

When the sale of an industry's products bears largely on the vicissitudes of nature, there is no recourse, from a practical standpoint, except to build sufficiently large stockpiles of pesticidal materials to satisfy the extreme potential. No matter how carefully a production program is established, there are so many variable factors in the brief seasonal demand, that inevitably, over a period of years, carry-overs are bound to result. Some years, the carry-over stocks will be so large that the gains of the previous season may be submerged by warehousing costs and interest on invested capital.

If we are to remain in this business of production of agricultural chemicals, we must be willing to accept the ups and downs over an extended period. Our top management must realize that in weighing the merits of the pesticides industry as a business, consideration must be given to the variability of each season's operations. There are seldom long periods of good profits in the pesticides industry. There are longer periods of medium profits graduating into small profits and losses. The mean for all profits, over extended periods, levels on a reasonable return.

Since it is practically impossible to ascertain a season's demand prior to the manufacturing period, only long-range planning by each company through a well-directed program, aimed at product development and varied outlets, can smooth out and stabilize the marketing of agricultural chemicals. One of the safety valves which can be used to cushion the effect of an off-season in domestic consumption is the export market. During the past season, many pesticide companies expanded old plants in foreign countries and built new ones. This does not mean that we should use the foreign markets for dumping excessive production in this country. It is our responsibility to maintain these markets continuously. During the early part of the current season, when the industry realized that stocks were not moving, every effort was made to obtain relaxation of export controls on some products. Considering our present stocks, export markets are still open and can serve to turn over the present supply of pesticides so that new, fresh stocks will be available for next season's use.

Must Buy Early

BECAUSE our season of distribution is so short, a buy-early program is necessary in order that we move the 1¼ billion pounds of pesticidal chemicals in 30 to 90 days. Simply because weather conditions in 1952 did not produce an insect infestation which would rapidly drain off pesticides in the distribution channels, is no certainty that a like situation will occur in 1953. Our buy-early program must be rebuilt.

There is reason to believe that many of the goals set by the Defense Production Administration for the production of food, fiber and feed have been reached for the present. As our population increases, however, production goals will have to be set higher and higher. This will

take up our present productive capacity of pest control chemicals and cause further necessary expansion of the industry.

Conservation programs such as the grasslands improvement program now in force throughout the world present vast new markets for pesticides. There are some 800,000,000 acres of grasslands throughout the United States which can be improved through the use of chemicals. The prices of meat, milk and animal fiber are such that improvement of grasslands by use of chemicals is highly profitable.

Forest insect and disease control has been adopted as a national program and offers outlets for pesticidal materials. Soil conservation involving the use of grasses and legumes increases the production of seed — a high-value crop requiring the use of agricultural chemicals for profitable production.

The economy of our country is such that a farm-labor shortage now exists and will continue to worsen. This problem has been alleviated to a large extent through the use of chemicals and mechanization. More and more reliance will be placed on chemicals to increase agricultural production on the limited number of acres available.

We need a program directed by top management which believes in merchandising. By merchandising, I do not mean solely the packaging of our products in an attractive manner, but merchandising in its broadest sense. New markets and uses must be developed; old markets should be expanded. Advertising should be directed toward education. Credit surveys permit an examination of the industry's credit practices and position in relation to other industries, and point the way to sound financial policies.

Acceptability of our products by the public is essential to continued operation of the industry. Educational programs familiarizing the public with the importance and necessity of these products in the production of food and fiber are essential. The use of these products in the right way must be a part of this program.

A comparatively poor year in sales of agricultural chemicals does not signify a collapse of the industry. We are in a period of transition where our expansion, at the express request of government agencies, has overreached the current season's demand. The only limit for the expanion of sales of agricultural chemicals lies in the degree of the industry's will to search out new products, markets, expand old ones and educate the agriculturist in profitable use of pesticides through merchandising programs. There are many undeveloped markets available to the industry which can be tapped only through sound merchandising to create the demand for our materials.

As a source of information and coordination, we already have the machinery from which to produce such an industry-wide program — the National Agricultural Chemicals Association.★★

Phillips Office Moved

The district sales office of Phillips Chemical Company has been transferred from Los Angeles to Pasadena, California, where it will be located in the Citizens Bank Building, 16 North Marengo Avenue. Robert B. Prock is in charge.

SUPPLIERS BULLETINS

(*Continued from Page 69*)

practiced.

"Livestock Pest Control" is now available for showings to livestock asociations, agricultural groups, schools, 4-H clubs and similar groups. Requests for showings will be filled in order of receipt and should be directed to the California Spray-Chemical Corporation, Richmond, California.

•

Miticide Described

A new extremely fine wettable powder is outstandingly destructive to mites in the egg stage. In fact, it is more effective as an ovicide than as an adulticide. It also has a long residual effect.

Called "Ovotron Wettable", it contains 50 percent p-chlorophenyl-p-chlorobenzenesulfonate.

Its toxicity to warm-blooded animals as well as to parasites and predators of crop pests is said to be low. It is also reported to have low toxicity to insect pollenizers.

Growers now have the opportunity to combine chemical and biological control in one operation. At the same time "Ovotran Wettable" is not hazardous to the operator.

It is chemically compatible with other insecticides and fungicides. For example, it is compatible with such chlorinated hydrocarbons as DDT, toxaphene, chlordane, methoxychlor and lindane, with phosphates, arsenicals and lime-sulphur. "Ovotran Wettable" is one of few materials compatible with alkaline mixtures.

To date, it has shown unusual miticidal effectiveness on citrus and deciduous fruit and nut trees, shade trees, ornamental shrubbery, cotton, melons, grapes and other crops. Widespread field tests have shown that this chemical is not injurious to these same plants and trees when it is used as suggested. With a few exceptions, it appears relatively nontoxic to plant foliage.

Dow Chemical Co. Bulletin, Midland, Mich.

ECONOMICS

(*Continued from Page 34*)

ceed. It is obvious that the earlier it can be recognized that a compound will fail, the less money will have been wasted on it, and the smaller will be the cost which a successful compound will bear. In Table III, a scheme has been chosen arbitrarily, whereby compounds are dropped out at various stages so that about one product in 1,800 eventually succeeds. This falls in line with our conclusion that only one compound in 2,000 screened is sold in any quantity. Remember that this is the

average experience and that any individual company may have an appreciably better or worse cost history on the chemicals it introduces.

Some saving over the cost presented is achieved by the dropping of compounds midway through field testing or development so that they do not use the full charge for that particular section. Of course, any accounting department would point out that it is necessary to assess against this expense an interest rate on the money expended until it was returned via profit. Another such cost is the not uncommon case of excess of cost price over sales price at the outset of production. There are other omissions but let us then use the figure of $1,000,000 as the cost of research and development of an agricultural chemical, admitting that it is a guess. For the 50 new chemicals introduced in the last decade the cost would be $5,000,000 per year. This is about 4% of the total present dollar volume sold. (High, but not out of line in an expanding field). There are at least 40 companies doing work in this field and this would figure to an average expenditure of $125,000 per year.

There can be no question but that this expenditure has been and will be continued to be justified as far as the farmer is concerned. Cases of his increased yields per acre and improved quality of product due to these new chemicals are well known. I believe also that this research can be profitable to companies provided that : (1) They can afford to invest a total of $1,000,000 or more over a five to ten year period before expecting a return on their investment: (2) They closely scrutinize and direct their work so that unsuccessful compounds are discarded as quickly as possible and that they do not work in fields where, if successful, the volume of the market is inadequate to return their investment; (3) They are prepared at the end of the five or ten years to invest the 2 to 10 million dollars necessary in plant equipment to take advantage of their research. ★★

Fred Lodge, NFA, Retires

Fred S. Lodge, a recognized authority in the fertilizer industry and for the past 18 years connected

with the National Fertilizer Association, retired August 1 from active participation in the industry.

Mr. Lodge held the position of secretary-treasurer of the NFA and was at one time its acting president. His thorough knowledge of the in-

dustry and its problems made him an authority not only in the United States, but abroad as well. He has for many years contributed technical essays on the subject of fertilizers to the *Encyclopoedia Britannica*, and is currently working on a new manuscript for it.

In all, Mr. Lodge has spent the past 44 years in the fertilizer industry. He was graduated in 1908 from the University of Illinois, and began working that year for Armour & Co. as a chemist. Through the years he advanced into more responsible positions and in 1933, was made assistant director of manufacturing.

Mr. Lodge expects to reside on his farm near Forkville, Pennsylvania, but will continue to maintain a desk at the NFA offices in Washington. He will be available to the Association for consultation at various times.

■

Locusts in Philippines

With swarms of locusts attacking many agricultural areas in the Philippines, including central Luzon, where the major portion of the nation's rice is grown, reports from the islands say that rice fields, corn fields and cocoanut trees have been stripped by the insects.

Late in August, the government had mobilized manpower and equipment to combat the infestation, and all available insecticides had been requisitioned for the task. Planes equipped with booms for spraying were being pressed into service.

According to reports from the Islands, the government had been slow to heed warnings of the impending attack, so that hasty preparations had to be made after the arrival of the locusts.

●

S. H. Doggett, Mfgr., Dies

Sidney H. Doggett, 54, president of Doggett-Pfeil Co., Springfield, N. J., died August 16 at a Morristown (N. J.) hospital. Mr. Doggett was one of the founders of the firm, established in 1921, and prominent in the manufacture of agricultural and horticultual chemicals. He was also a director of Doggett-Pfeil Co. of New York, Inc. His widow, 2 sons and a brother survive.

FERTILIZER OUTLOOK

(*Continued from Page 44*)

phosphate rock, mostly for fertilizer purposes.

Since 1940 the annual imports of potash have been running at less than 30,000 short tons (except in 1950 when imports jumped to 200,000 tons) compared with average exports of approximately 65,000 tons.

A major concern to both farmers and fertilizer manufacturers is the problem of transportation costs. Between 1939 and 1950 transportation costs accounted for 10 to 14 percent of the value of fertilizer at its destination. This does not include transportation costs of raw materials to fertilizer manufacturers. During the same period, transportation costs of phosphate rock accounted for 35 to 50 percent of its value at destination.

One of the most promising opportunities for lowering the cost of plant nutrients to the farmer is by increasing the concentration of mixed fertilizers, thereby reducing transportation, handling, storage, and bagging costs per unit of nutrients. It is estimated that a saving of at least $20 a ton of plant nutrients could be effected by increasing the concentration of the average mixture from 23 percent (the present level) to 30%.

The fertilizer industry anticipates a steady, substantial growth in production and use of the higher concentrations. In 1900, the average plant-nutrient content of mixed fertilizers consumed in the United States was 13.9 percent. By 1949, it had risen to 22.5 percent. The proportion of plant nutrients in mixed fertilizer is expected to rise to 27 or 28 percent by 1975 — provided the trend continues at the same rate of increase.

The transportation advantages of higher concentrations spring from the fact that — with certain exceptions — the same scale of rail and motor rates usually applies to all types of fertilizer and fertilizer materials.

How to Increase Use

ASSUMING sufficient supplies, there are several important ways that greater use of fertilizer for increased food and fiber production can be encouraged. In general, these are: (1) public policy, (2) technological progress, (3) education, and (4) economic feasibility.

Public policy, in the field of fertilizer use, favors efficient utilization of our soil resources to contribute continually to the highest possible standard of living for the people of the United States.

Technological progress-development of improved materials — both from the standpoint of plant-nutrient content and ease of handling will have a marked effect on future use of fertilizer. Much progress has been made with respect to certain crops in determining the combinations of practices which give far greater results than practices applied separately.

Education, through the dissemination of knowledge and skills in the use of fertilizer and demonstration of its practical worth in farming, has also been supported by public policy. Educational activities on the part of Government and industry — through radio, television, publications, meetings, tours, and demonstrations —will provide the farmer information to help get the most from fertilizer.

Finally, there is economic feasibility — a real test for the introduction or continuation of specific farming practices. Whether it "pays," in the final analysis, will largely determine how much fertilizer is used.

The favorable influence of coordination of the research, educational, and economic factors under the guidance of public policy is becoming increasingly evident since the close of the Second World War. The progress made indicates much greater opportunity in the future.

Fertilizer in new forms and formulas and the application of fertilizers in combination with other field operations, such as seeding, tillage, and the use of herbicides and irrigation water, point to areas of present research which may become more diverse and more extensive.★★

TECHNICAL BRIEFS

(*Continued from Page 73*)

lasts longer in poor soils; a shorter time in soils high in organic matter. Results of experiments with samples of 85 different soil types gathered from seven eastern states showed that persistence of DDT was about the same in sandy, silt, or clay loam, but much greater in soils made up primarily of sand.

In terms of dead Japanese beetle grubs, laboratory tests involving more than 223,000 of these soil-dwelling pests showed DDT beginning to lose its killing power only in the fifth year after application. A single treatment with DDT at the 25-pound-per-acre rate resulted in 98 percent grub kills within about four weeks after the grubs were put in the soil, during the first four years. It required slightly more than five weeks to get the same kill during the fifth year.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 175 Fifth Ave., New York 10. Closing date: 25th of preceding month.

Positions Wanted:

Ph.D. PLANT PATHOLOGY, M. A. organic chemistry. Considerable experience field crop disease control, herbicides, bio-assay and development of agricultural chemicals and agricultural chemicals field in general. Wishes responsible position, research or development. Address Box 667, c/o Agricultural Chemicals.

BIOLOGIST, Ph.D., 20 years biological research experience, desires position as head of biological research program in agricultural chemicals. Has proved capabilities as research leader. Excellent knowledge of chemistry. Enthusiastic, hard worker. Married. Good health. Address Box No. 668, c/o Agricultural Chemicals.

Positions Available

CHEMICAL ENGINEER: Real opportunity for young man not over 30 years. No engineer so employed; therefore, individual initiative and developments will not be lost through maze of personnel. Variety of engineering duties. Agricultural chemical background desirable, but not essential. Philadelphia area. Address Box No. 669, c/o Agricultural Chemicals.

SALESMAN WANTED: Established eastern agricultural chemical firm desires aggressive salesman for west coast with headquarters in Los Angeles area. Excellent opportunity for sincere individual. Address Box No. 670, c/o Agricultural Chemicals.

OPPORTUNITY—Technical-minded salesmen with chemical, agronomy or related background and proven sales record to represent leading manufacturer of agricultural chemicals in mid-western and southeastern states. Challenging combination of sales and development. Qualified men will find permanent positions with attractive growth opportunity. Reply in confidence to Box No. 671 c/o Agricultural Chemicals.

AGRICULTURAL CHEMIST with experience in liquid insecticide manufacturing, position in the far West. References required. Replies held in confidence if desired. Address Box 672, c/o Agricultural Chemicals.

AGRICULTURAL & INDUSTRIAL CHEMICAL SALESMAN required by expanding firm. Territory — southern states, east of the Mississippi River. Prefer southern resident centrally located. Please state background and experience. Exellent opportunity. All replies confidential. Address Box 673, c/o Agricultural Chemicals.

Miscellaneous

Buy-Trade-Sell: Phenol, Naphthalene, Para, DDT, BHC, Pyrethrum, Glycols, Cellosolves, Ethanolamines, Other Chemicals, Solvents, etc. Chemical Service Corporation, 86-02 Beaver St., New York 5, N. Y.

FOR SALE: 20,000 lbs. 10 Gamma BHC dust concentrate; 30,000 lbs. 50% DDT dust concentrate, 50 lb. 4 ply paper bags. Nationally known brand Excellent condition. Will sacrifice. Send us your offers. Chemical Formulators, Inc., Box 35, North Charleston, W. Va.

FOR SALE: Brush control business. Netted $10,000 or $40,000 gross in '51. Engaged in brush control service along hwys. and right of ways in N. Y. State. Farms and pvt. property offer excellent potential for expansion. Sale incls. 4 acres of land, equip. (valued at $30,000) and good will. A sound investment opportunity at $90,000. No. 2H-5412 Affiliated Brokers of Charles Ford & Assoc., Inc., Dept. 2312, 10 N. Clark, Chicago, Illinois.

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ACS to Alantic City Meet

Three days of the week-long fall meeting of the American Chemical Society at Atlantic City, N. J., were to be largely devoted to the section on fertilizer technology. These days, September 17, 18 & 19, were to feature scores of papers on fertilizer manufacturing, application, and chemistry.

Dr. S. F. Thornton, F. S. Royster Guano Co., Norfolk, Va., is chairman of the section and J. D. Romaine, American Potash Institute, Washington, D. C., secretary.

The Division of Agricultural and Food Chemistry was to conduct a number of symposia, including one on the formulation and action of herbicides. Dr. A. S. Crafts, University of California, was to preside at this symposium.

Presentation of the ACS Priestly Medal, highest honor in American chemistry, was to be presented to Dr. Samuel Colville Lind, Carbide & Carbon Chemicals Corp., Oak Ridge, Tenn., as one of the highlights of the meeting.

Advertisers' Index

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission.)

MEETING CALENDAR

National Agricultural Chemicals Assn., Essex & Sussex Hotel, Spring Lake, N. J., Sept. 3, 4, 5.

American Phytopathological Society, Cornell University, Ithaca, N. Y., September 9-12.

Fertilizer Section, American Chemical Society, Convention Hall, Atlantic City, N. J., Sept. 14-19.

Association of Official Agricultural Chemists, Shoreham Hotel, Washington, D. C., September 29 to October 1.

Association of American Feed Control Officials, Shoreham Hotel, Washington, D. C., October 1 & 2.

Association of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C., October 3.

Association of Economic Poisons Control Officials, Shoreham Hotel, Washington, D C., October 4.

National Pest Control Association, Rice Hotel, Houston, Texas, October 20-22.

Meeting of Fertilizer Section of National Safety Congress, Chicago, Ill., October 22 & 23.

Southwide Chemical Conference, Auburn Alabama, October 23-25.

Sixth Annual Beltwide Cotton Mechanization Conference, Bakersfield, California, Oct. 22-24.

California Fertilizer Association, Desert Inn, Palm Springs, Calif., Nov. 10-12.

New York State Insecticide & Fungicide Conference, Ithaca, N. Y., November 11-13.

National Fertilizer Association Fall Meeting, Roney Plaza Hotel, Miami, Fla., November 19-21.

Joint meeting, North Central Weed Control Conference and Western Canadian Weed Conference, Royal Alexandra Hotel, Winnipeg, Canada, December 8, 1952.

American Association of Economic Entomologists, Hotel Bellevue Stratford, Phila., Pa., Dec. 15-18.

TALE ENDS

HAROLD Noble, vice-president of S. B. Penick & Co., New York, and Prof. Carl Paul Link of the University of Wisconsin, presented a round-table discussion on rodent control which was broadcast by "Voice of America" on July 31. The discussion, which covered chiefly large scale rodent control with warfarin, lasted for 15 minutes and was beamed to the British Isles, Germany, other parts of Europe and North Africa.

Prof. Link, discoverer of the anti-coagulant rodenticide powers of warfarin, handled scientific phases of the broadcast while Mr. Noble outlined the history of the use of the material in rodent control in the United States.

The original round-the-world "Voice" broacast has been rearranged for a rebroadcast in native languages to all countries of the Far East, Middle East, and throughout Latin America. When the rebroadcast program is completed it will cover the full scope of the "Voice of America" broadcasting range.

Cornell Veg-News recently carried a brief item lauding the merits of a "new fertilizer," called "ERUNAM". It termed the article an "inert soil conditioner," a "selective pesticide," killing harmful weeds, bugs and diseases while fraternizing with "approved" ones . . . contains no "nasty chemicals; it's purely organic" and "one pound of this concentrated product is equivalent to 16 ounces." The product? Erunam, spelled backwards, spells "MANURE."

We still think that someone should come forth with a product, "Drawrof," which spelled backwards, spells "forward".

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Crop duster planes seem to have a number of functions aside from applying various kinds of toxicants to various agricultural crops.

The latest such role is that of a rescue taxi to hustle people from communist-dominated lands.

Miss Hana Pavlickova, 24, upon arriving in the U. S. recently as a refugee, said she was one of four persons who squeezed into a single-seater crop-dusting plane in Czechoslovakia and was hustled over the border via this improvised airlift. So crowded was the plane, she said, that one of her legs was dangling outside as the pilot took off.

The plane had been dusting fungicides on potatoes that Czech propagandists claimed had been infected with a "plague" by American airmen.

•

J. F. Prochaska retired recently after 42 years of service in the agricultural chemicals sales department of E. I. du Pont de Nemours & Co., most recently in the Cleveland office. Mr. Prochaska was originally with the Grasselli Company and joined Du Pont when Grasselli was incorporated as a division in 1928. Mr. Prochaska was active in forming the Ohio Pesticide Institute in 1947.

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BASE MATERIALS and TOXICANTS

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Check Your Needs Here... Then Call General Chemical!

DDT Technical Dust Base, 50% & 75%	**LEAD ARSENATE** Standard Astringent Basic	**LINDANE** Technical Dust Base, 25% Emulsifiable Concentrate, 20%
BHC Technical (15%, 36% & 90% Gamma) Dust Base, 12% Gamma	**DDD** Dust Base (50% DDD)	**PARATHION** Dust Base Emulsifiable 284 lbs. per gal.
CALCIUM ARSENATE Standard Low Lime	**ZIRAM** Dust Base (76% Zinc Dimethyl Dithiocarbamate)	**FERBAM** Dust Base (76% Ferric Dimethyl Dithiocarbamate)
2,4-D Acid, Amine, Esters Formulations	**2,4,5-T** Acid, Amine, Esters Formulations	**TCA SODIUM SALT** 90% Dry Powder 50% Liquid Concentrate
POTASSIUM CYANATE Technical Cotton Defoliant	**DINITRO** Pre-Emergence Herbicides	**ORGANIC MITICIDES** "Aramite" Genite® 883 (p-chlorophenyl p-chlorobenzene sulfonate) ®General Chemical Trade Mark

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Serving Agriculture from Coast to Coast

Stored Corn can be kept Weevil-Free

Pyrenone* Grain Protectant gives complete storage season protection with one application

Wicked Willie Weevil — the symbolic character that helps thousands of farmers recognize Pyrenone Protectant advertising.

Wicked Willie Weevil destroys millions of dollars worth of corn and other grains every year. He can eat up over 50% of a stored grain crop in a single season. But there is a way to prevent this damage. Pyrenone Grain Protectant will increase your profits, and the farmer's profits, because treated corn weighs more, puts more weight on livestock and brings more money.

Pyrenone Grain Protectant will stop Wicked Willie in stored grain for an entire storage season with only one application . . . even in open cribs. There's no danger to the applicator and no danger to livestock or humans who eat treated corn . . . and no evidence of foreign taste. Germination of seed corn is not affected. Treated grain can be milled without any special handling or precautions.

Pyrenone® Wheat Protectant, a product made especially for wheat is available in 50 lb. bags. Kansas State College says, "1951 farm tests outstandingly favorable for Protectant treatment."

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Pyrenone*

GRAIN PROTECTANT

*Reg. U. S. Pat. Off.

Dept. AC
U. S. Industrial Chemicals Co.
Division of National Distillers Products Corporation
120 Broadway, New York 5, N. Y.

Please send me complete information on Pyrenone Grain Protectant.

Name _____

Firm _____

Address _____

City _____ State _____

It takes only one pound of Grain Protectant to treat 10 bushels of corn, and it is packaged in 50, 25 and 10 pound bags to supply the convenient amount for any size crop.

This new method for control of stored grain insects gives the agricultural chemical industry a whole new field of service for helping the American farmer fulfill the nation's food requirements.

But for the farmer to have this Protectant when he needs it, his dealers must get their stocks on hand right away!